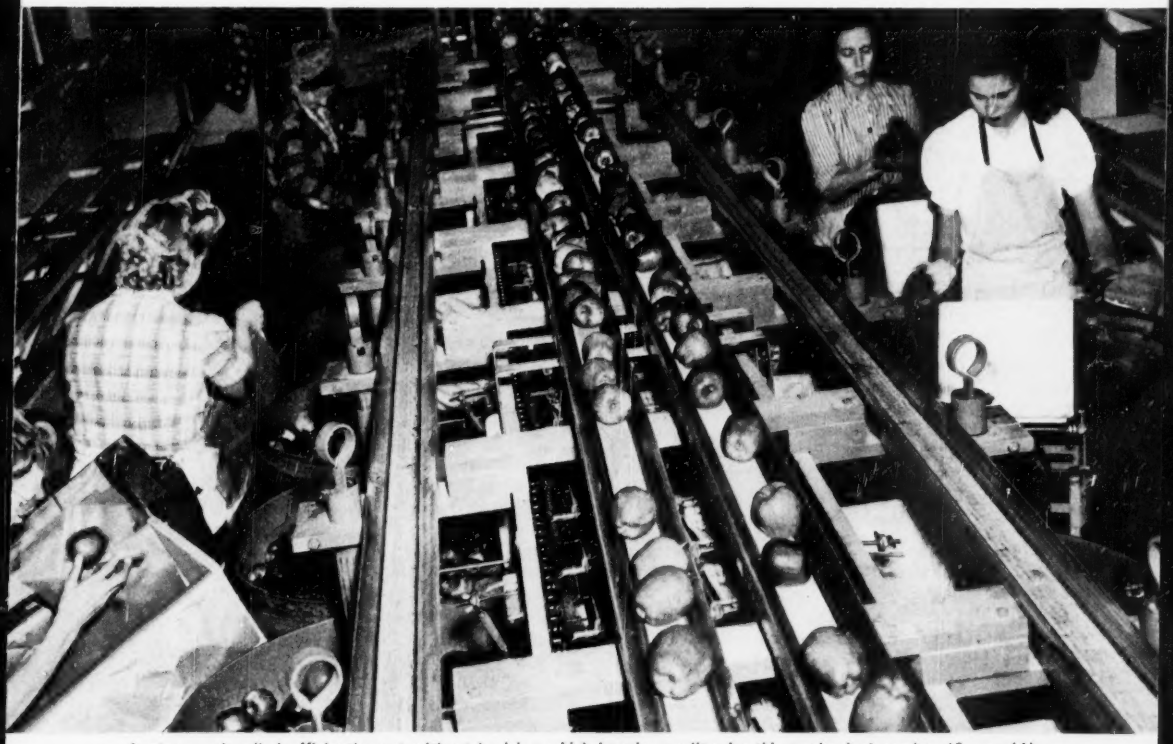
NATIONAL EDITION

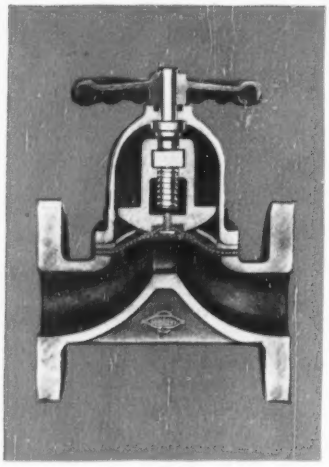
Food Industries

For those who control quality and costs through management and production — a McGraw-Hill publication

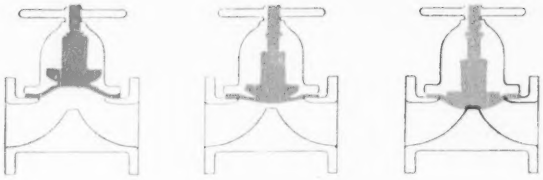


Apples are handled efficiently, yet without bruising which impairs quality, by this mechanical grader. (See p. 64)

FEBRUARY, 1950: Millions for modernization, Dexterity tests boost output, Planned packaging, Electronic sentinels, Quality control, Report



If you need a diaphragm valve you need all the advantages of diaphragm closing



Check these popular features of

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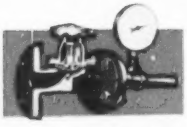

Diaphragm gives leak-tight closure against grit, scale, solid matter . . . Even when something as substantial as an 8-penny nail is trapped on the weir of a rubber lined valve, as illustrated, the resilient diaphragm, plus the large area of contact, gives leak-tight closure against pressure or vacuum.

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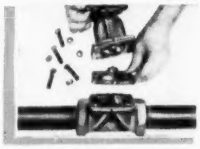

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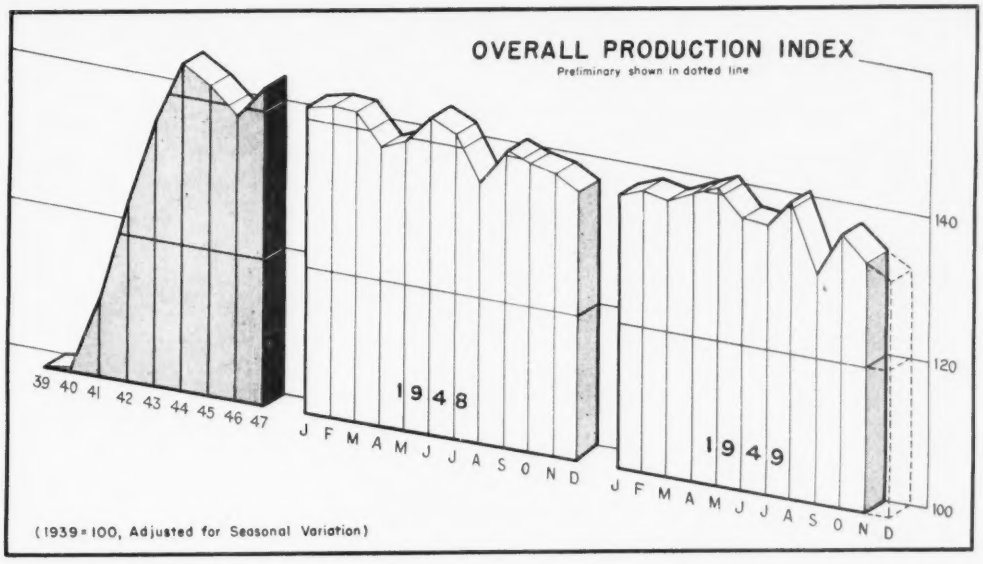
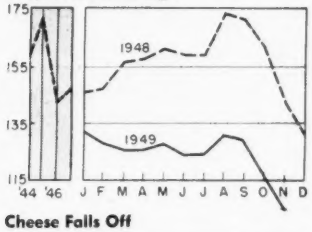
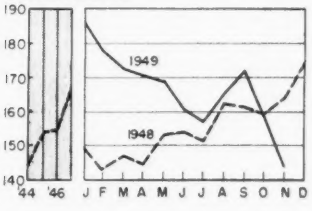
FI Index and Outlook


OVERALL PRODUCTION INDEX
Preliminary shown in dotted line
140
120
100
39 40 41 42 43 44 45 46 47
1948
J F M A M J J A S O N D
1949
J F M A M J J A S O N D
(1939=100, Adjusted for Seasonal Variation)

Evaporated Milk Slips



Cheese Falls Off



Food Output Continues Decline Below Seasonal Margins

Broad revision in method of computation causes alterations in most component indexes

ONCE AGAIN, food production dropped in December, bringing the index to the lowest point reached since 1946. This was the fourth month of the past five in which output of processed foods showed a decline. Processing activity normally slides some in the fall months, after reaching a peak in September. But this year the downtrend has been much more than seasonal.

The preliminary figure for December, seasonally adjusted, is 132. November (revised) was 134. In August the index stood at 140.5.

The current level of food production appears less than consumer demand will justify in the long run. This is the first time since 1946 that output has remained much below the 140 level for any length of time.

This month, FOOD INDUSTRIES is introducing a number of revisions in its index. The changes are made necessary by revisions in the government data on which our index has been based, namely the employment figures supplied by the Bureau of Labor Statistics. BLS figures have been changed chiefly in three ways:

1) Many plants have been reclassified as to principal product. Where the main product of a large plant has changed in recent years, the result is a considerable shift in reported employment between various branches of food processing.

2) The Bureau's estimates of output per man-hour have also been revised. The FI index measures production as a combination of man-hours worked and output per man-hour.

3) Statistics of employment have been discontinued for some branches of the industry. This is because Congress did not vote BLS enough funds to collect all the figures.

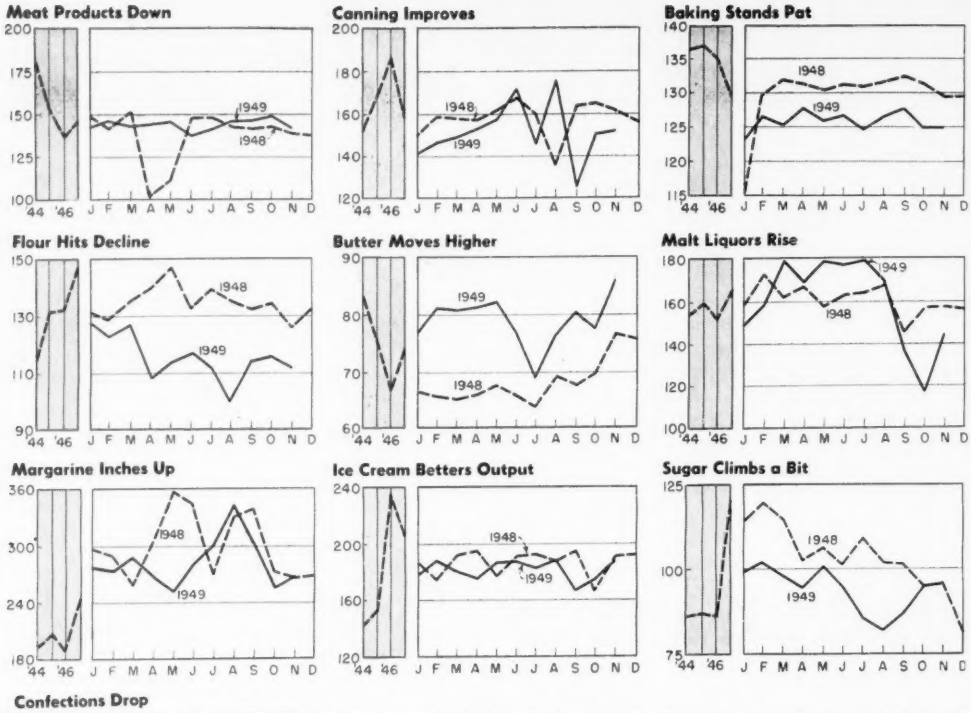
Revisions in government data must be expected from time to time, although this is the first major overhauling since the war. Whenever corrections are made in the statistics

At a Glance

(1939 = 100, with all figures adjusted for seasonal variations.)

Note: All figures have been revised (see text).

	Nov. 1949	Oct. 1949	Percent Change	Year Ago
Baking	125	125	...	129
Butter	87	78	+12	77
Canning	153	150	+2	162
Cheese	144	159	−9	164
Confectionery	130	143	−9	193
Evaporated Milk	104	124	−16	142
Flour	112	115	−3	128
Ice Cream	187	175	+7	191
Malt Liquors	145	117	−24	158
Margarine	268	257	+4	266
Meat Products	143	149	−4	139
Sugar	96	94	+2	96



relating to food processing, FOOD INDUSTRIES charts will be brought up to date accordingly.

The discontinuance of statistics on employment in certain branches of food processing is, however, unfortunate because it forces us to change the basis of our production indexes for these branches. Since employment data are no longer available, the production indexes for Evaporated Milk, Flour, Ice Cream, and Malt Liquors will now be based on the physical output series reported by the Departments of Agriculture, Commerce and the Treasury. The differences between the new charts (based on physical output) and the old ones (based on man-hours of employment) are discussed below. The charts on beverage and cereals production have had to be scrapped entirely. But a new chart on cheese has been added.

All the charts on these pages have been changed in some degree by the use of revised data on employment or by the substitution of data on physical output. In addition, all figures have been corrected by the application of new seasonal adjustment factors to take account of recent changes in seasonal production patterns.

Old and New Charts Compared

Here is how the individual charts compare with those which were shown in previous issues:*

The *overall index* is still based on man-hours and remains at about the same level as formerly. However, some changes will be noticed in the month-to-month trend of production. The rise in overall food production in the fall of 1947 and 1948 and the corresponding drop in spring of 1948 and 1949 were very pronounced on the old chart. Careful study of the figures indicates that these fluctuations were probably exaggerated by purely seasonal factors. On the new chart, a better seasonal adjustment modifies the extent of the ups and downs.

There is also an important revision in the trend of the overall index for September and October. The revised figure for September shows a drop from August. And October shows a recovery from this lower level instead of a decline from a higher one. This somewhat drastic shift can be attributed to the fact that September and October were months during which the new FI index was still in preparation and during which time government figures on the old basis were no longer complete.

(*Continued on page* 196)

* For a more detailed explanation of the revisions in the FI chart for your own specific branch of the industry, write Index Editor, FOOD INDUSTRIES, 330 W. 42nd St., New York City 18.

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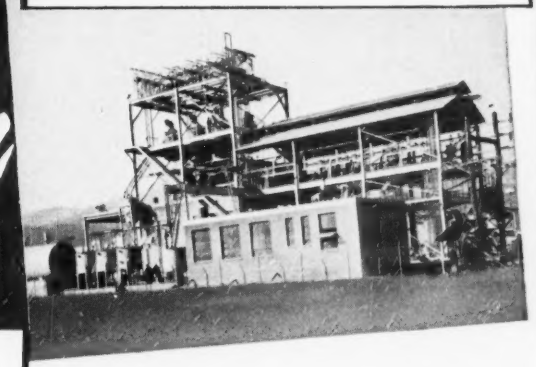

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The Talk of the Industry

Better Look—Your Slack May Be Showing

If you are packaging bulk products in drums, better look to see if your slack is showing. But you'll have to visit one of your customers some distance away. Won't do any good to make the check in your own place.

It seems that many processors of bulk powdered materials, such as dry milk and malt, are wasting their money on oversize containers. At the same time, they are annoying buyers who find containers partly empty when they open them.

Because the drums are subjected to constant vibration during shipping, the contents settle and leave a headspace of 5 or 6 in.—sometimes as much as a foot. By vibrating the drums before they are shipped, the material can be presettled. Then chances are that a smaller container will suffice, reducing packaging costs and freight. Also, fiberboard containers are weakened by too much headspace.

Here's an opportunity to shake some costs out of bulk packaging.

Dry Housewives Prefer Prewashed Foods

Producers of canned, frozen and prepackaged vegetables can find a new sales angle in the dispatches from communities in the East which are short of water. Housewives prefer the processed items because they require no water for washing.

Even a dry cloud has a silver lining for someone.

Some Grain Mill Observations

The idea of using proportioners and a screw conveyor, to put the production of mixes on a highly efficient continuous basis, is spreading. We recently went through a flour mill feed plant which has a screw conveyor several feet long into which each of a series of volumetric-type proportioners discharges one of the ingredients which go into the finished product. And the conveyor empties directly into the bagging machine hopper. It's hard to conceive a simpler method.

This same technic, with more precise proportioners of the weigh-belt type, has been in operation for several months in a new prepared bakery-mix plant, and is being installed in a second plant of this type.

Incidentally, a flour mill really can be kept clean. This much we have seen in Louisville. We also learned that prepared mix cartons can be assured of proper fill by a relatively new type of machine. This unit fills from the bottom, and it jars the cartons to pack the mix. Jarring occurs as the cartons move over a series of falls as they travel around the periphery of the multiple-head filler.

Meat From Our Travels

With a bang-up surplus of lard, it is perhaps significant that the Department of Agriculture has developed a new breed of hog. Derived from the Danish bacon pig, it produces relatively little lard and a high proportion of good lean meat. It feeds out fast and efficiently, and if packers offer farmers a little bonus for this type of animal, the lard surplus problem might be solved and a lot of pork eaters provided with more tasty meat.

Speaking of pork, some of the small Eastern packers again are concerned about a new influx of canned Polish hams. Fed on barley, the Polish hogs produce a quality of meat that Americans thoroughly enjoy. It is alleged that the State department made an international deal whereby some of our surplus lard was exported in exchange for Polish ham imports.

Going from the East to the Midwest, we find that a machine has been developed by a meat packer to put frankfurters into cans and eliminate a tedious and costly hand operation. Details will be available when the patents are obtained.

To end the meat tour, let us mention the dry rendering process for inedible fat which we saw in operation. It is much less messy and more efficient in terms of labor than wet rendering. But it must be carefully controlled to avoid producing a dark tankage.

Continuous Cake Batter

Two types of continuous mixers have proved successful in the production of cake batter. One has been in operation for a few months in bakeries in Birmingham and other cities. The other recently was installed in a Detroit bakery.

But someone has yet to meet the challenge of mixing bread continuously. Experimental work has been done with one machine, but we haven't yet come across it in commercial operation. If you have, we would enjoy having our oversight corrected.

Hors d'Oeuvres

■ Among the corn control problems heading toward USDA this year is How to Keep a Farmer From Giving His Hog an Extra Bushel. Easy! Instill some pride in the hog and talk him out of eating it.

■ Worry, worry, worry. Now it's the question of what the California olive industry will do if they develop a bigger olive. At present, "Extra Large" ranks seventh in size and "Mammoth" sixth. You're wrong on your next guess, too. "Super-Colossal" is only second.

■ We have word of an automatic bartender that "does everything, at the push of a button, except give fatherly advice." Bet it doesn't pull your half empty glass away for a refill at the regular rates, either.

■ England's Ministry of Food reversed itself recently to say that sherry wines may be called "Bristol Milk" and "Bristol Cream." "No one but an imbecile could connect sherry with the product of a cow," said the Ministry. Doubt if an imbecile would do it deliberately.

■ Cactus apples are being shipped east from California. Fruit comes inside a prickly husk, and its flavor is said to be a cross between a pomegranate and a watermelon. Before putting on your own taste test, it might be well to have something handy in case you want to cross some more.

■ Eastern Ontario Women's Institute wants removable lettering on flour bags, and designs that can be used for bedspreads or curtains. . . Also, we'd like heavier material, please, for drapes, rugs and overcoats. **J. A. J. J.**

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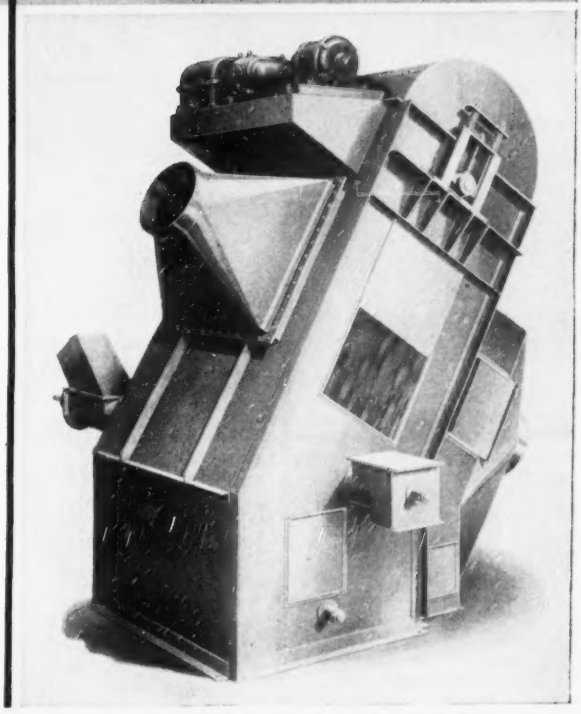

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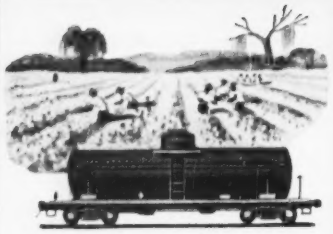
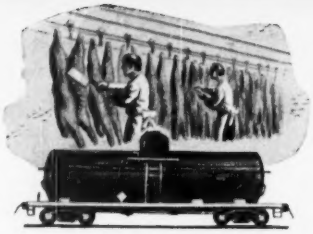
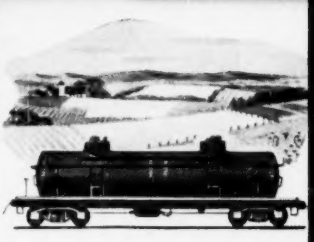


COTTONSEED OIL



LARD



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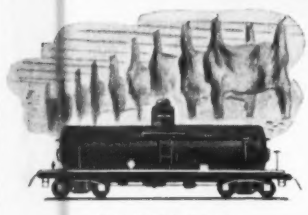

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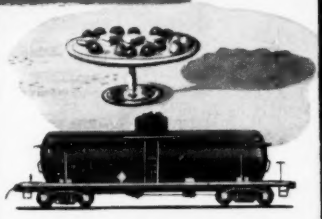
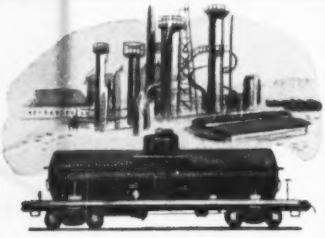
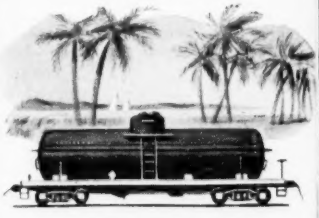


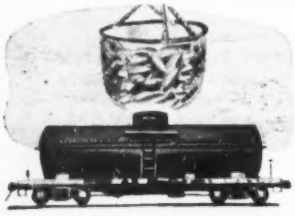
CORN SYRUP UNMIXED



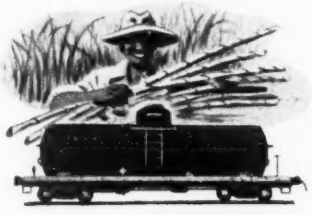
CORN OIL



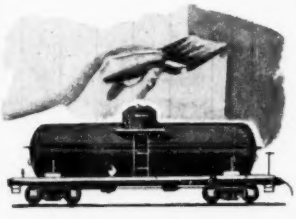
COCONUT OIL



FISH OIL



MOLASSES



TUNG OIL

What Washington Thinks

A TWO-PART LAW—The Research & Marketing Act of 1946 is often thought of simply as federal support for more investigations of means for processing agricultural products. It is more than that. It definitely provides also (in Title II) for educational work in the use of scientific and engineering research benefits. This accounts for the fact that much of the recent publicity from R&MA has to do with what some cynics call the "peddling part" of the food business. Of course, we technical folks might be glad if all the spending were on new technical developments. But that isn't what the law says.

SELF-SERVICE MEAT — Investigation, in about 100 stores, covering shift of meat sellers to prepackaged self-service meat counters has shown some interesting results for PMA of the Department of Agriculture. The public reaction was apparently good in all but 20 of 97 stores surveyed in a preliminary way. In 46 of the 51 establishments intensely investigated, sales increased with changeover to self-service. Two changes in food technology are expected. More meat cutting at central points with package distribution to small shops is indicated. More demand for adequate packaging materials for both frozen meat and chilled meat will be required. Of course, a big increase in refrigeration equipment will be needed at shops when the prepackaged goods are spread out over large areas instead of being kept compactly in a big refrigerator. The new problems reach clear back to the original animal-killing establishments.

VACUUM COOLING—Speedy cooling of many products is essential for their effective preservation until completion of processing. Tests on leafy vegetables show that rapid cooling is essential if immediate blanching and processing is not feasible. This fact has created added interest in the new methods of vacuum cooling, which have been tested recently by field workers of the Department of Agriculture. Lettuce, for example, was cooled from 70 deg. to 33 deg. F. in 22 min. The cooling is accomplished by evaporating moisture from the material, or off the surface of the material on which it has been sprayed. With care, the process can be utilized on bulk material, crated products, and even on prepackaged goods if the packages are not subjected to a very rapid drop in pressure causing rupture of the wrapper. The experimental results reported to date are so favorable that attempts at commercilization are hoped for this year.

POOR FARMERS—Despite government aid, American farmers during 1949 took in about 10 percent less cash from farm marketings, than during the preceding year. This is leading to much demagogic Congressional wailing on behalf of the underprivileged agricultural part of the community. But a total of $27,500,000,000 does not sound like hard times to the impartial observer. It's easy to remember when $12,000,000,000 was thought to be prosperity after the hard, lean years of the early 1930's. Even though the parity ratio is down around 100, there is no serious need for sympathy on the general run of farm problems.

WORLD-WIDE BARTER—The Economic Cooperation Administration has the authority to buy goods abroad for the emergency stockpile, using government surpluses in payment. It has already arranged to get considerable lead and zinc, for example. There is no reason why food processors wishing to get other goods abroad, either for themselves or to sell to the government for stockpile purposes, should not arrange trades, using burdensome surpluses of foods. Stabilizing the processing industries by elimination of surplus raw material hanging over the market would be a smart scheme if it could be arranged.

MORE TOXICOLOGY — Each first-class food company will shortly need to have a toxicologist, if present trends continue. More and more stress by government agencies on the hazards of additions to food and unwanted residues in food raw materials strongly emphasizes this problem. Perhaps there will be no satisfactory answer until the important trade associations see to it that their interested members get the most skilled service available at a reasonable group cost. Obviously, it would be exorbitantly expensive if each company were to hire specialists. And, besides, there aren't enough skilled workers to go around.

YES, WATER IS SCARCE—A few outstanding areas of water shortage have spotlighted a problem that is really national in scope. Food executives seeking new plant locations should now readily appreciate the importance of judging a plant site from the standpoint of adequate supply for the indefinite future. Thus, the water-quantity question is added to the quality problem for many parts of the United States.

PREPACKAGING WORRY—Not all prepackaging simplifies food handling. A two-year study of the citrus business shows that prepackaged fruit is often more roughly handled and arrives at the retail store or home kitchen more damaged than does the fruit in the conventional commercial crates. Automatic bag-filling machines and bulk handling of mesh bags in large numbers are still problems which the Department of Agriculture considers unsolved. Incidentally, neglect to cool fruit promptly at point of production, as well as failure to maintain proper fruit temperatures and atmospheres are more important in packaged fruit than with loose or crated material. One bad orange in a bag ruins the whole bag, whereas it can easily be rejected by the storekeeper or by housewives from a lose pile. As often, progress is painful.

FARM BATTLE—Attempting to give farm relief by legislation and executive action has created two violently opposed spokesmen groups in Washington. Led by Secretary of Agriculture Brannan is the farm-income support program, backed by some of the farmer organizations. Opposed is the group led by the equally valiant and more experienced Senator Clinton Anderson, who appears to have the support of several of the more conservative farmer organizations, like The National Grange. It will be a battel of giants all through 1950, first in Congress and then in the political campaigns.

THE STRONG MAN—Plant workers should be taught to lift things properly. There is no place in the industrial organization for the braggart-type of "strong man" who is always trying to show how much more he can lift by sheer strength and awkwardness. He is apt to hurt himself. Worse than that, he is a bad example. Bureau of Labor Standards believes these things, hence has prepared its cartoon-illustrated Bulletin No. 110, "Teach Them To Lift". Ten cents for this leaflet may save an injury claim.

—R. S. McBride, Washington, D. C.

HIGHLIGHTS

Use of antibiotics in canning gained some publicity as a result of test reports released by USDA. Western Regional Research Lab has been adding a small amount to canned vegetables with favorable results – so far. But there is a long way to go. (See News section)

Food crop yields up to four times the current rate are foreshadowed for future generations through new studies concerning single-celled green plants and their utilization of solar energy. The team of scientists, headed by Prof. Otto Warburg, chemist and Nobel Prize winner, may lift a cloud or two from the future of the race.

Coin-operated milk vending machines are getting a test in New York City apartment houses. Leased by the City Milk Co., Maspeth, Queens, N. Y., the machines are geared to make change and are expected to cut retail price of milk. Could mean a drastic change in milk distribution.

Harbor pollution waste suddenly becomes a profitable product in the case of stickwater, the clarified press liquor from fish waste. The continuous, economical Sharples-Lassen process recovers condensed fish solubles, high in vitamin B_{12} and protein – plus additional premium-grade fish meal and oil. Better look a little deeper into those pollution wastes now causing you trouble. (See article)

Advance plans for modernization and expansion in the food industry call for an expenditure of $585,000,000 in 1950. Last year the industry planned an outlay of $525,000,000, but actually spent more – $600,000,000. Modernization again gets the lion's share, with 68 percent going for replacements and labor saving equipment. (See article)

Efficiency in the packing line has been stepped up 5 percent by a unique counting device that leaves a continuous record on a strip chart. Used in a West Coast brewery, the unit counts bottles. The counts are converted into electrical impulses, then by means of an electric charge accumulator and a potentiometer, the tell-tale strip is marked for the foreman to check. Definitely shows up any slow-up. (See article)

Raw material prices will stay high in 1950 because Uncle Sam will continue to hold them up. The support program means that CCC will need a $1-billion to $2-billion shot in the arm from Congress this year. It also means controls on peanuts, this year, and on corn, rice and wheat next year. And don't forget Brannan's plan. He won't. (See article)

Extraction of oils, juices, and other fluid components of vegetables, nuts, seeds and berries, with a continuous-feed roller-type hydraulic press that exerts tremendous pressure, is being studied at Armour Research Institute, where a model has been installed. Dubbed the Staco-master, the unit has three rotating members, the action of which makes possible intake into the rolls of relatively soft materials. And the pressure does not generate quality-destroying heat. (See Equipment section)

Dexterity tests made it possible for P. J. Ritter to put its fastest hand packers on the asparagus lines at a time when speed was paramount – saving the usual, costly structural changes and equipment shifts. Tests showed, too, that older workers could more than hold their own with the whipper-snappers. Even indicated one 81-year-old woman, could do a bang-up job. And her performance proved it. (See article)

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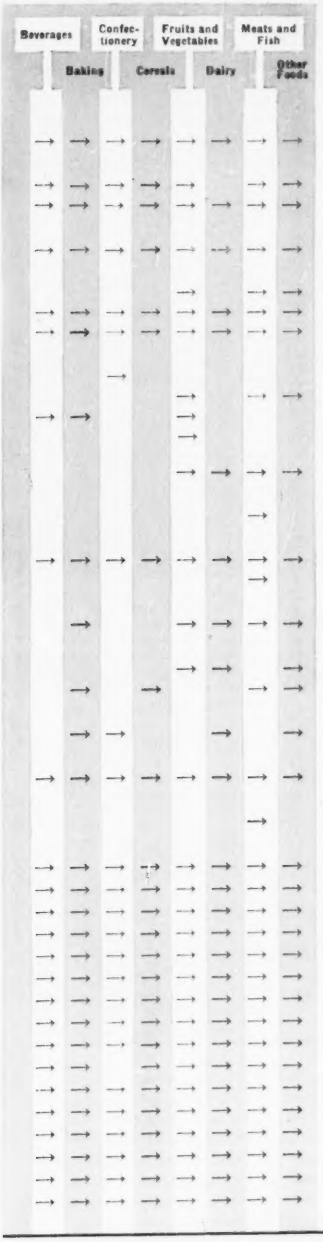

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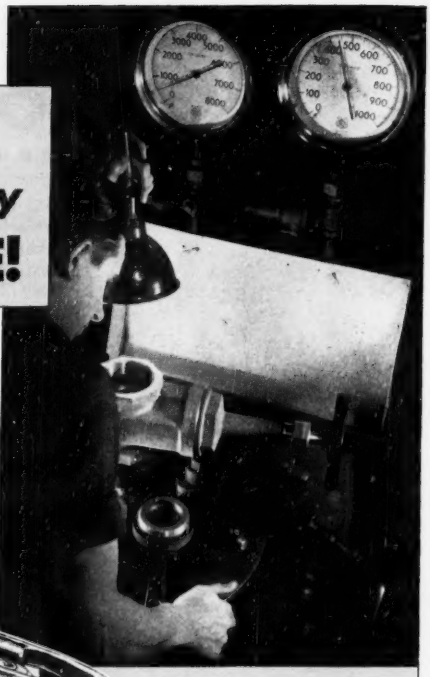

RIGID TESTING, far above the usual practice, is regular procedure in the production of Lunkenheimer Valves. From selection of raw materials to final assembly, nothing is left to chance or guess. Each and every operation is gauged to meet the high quality standards which assure dependable performance, longer service life and minimum upkeep.

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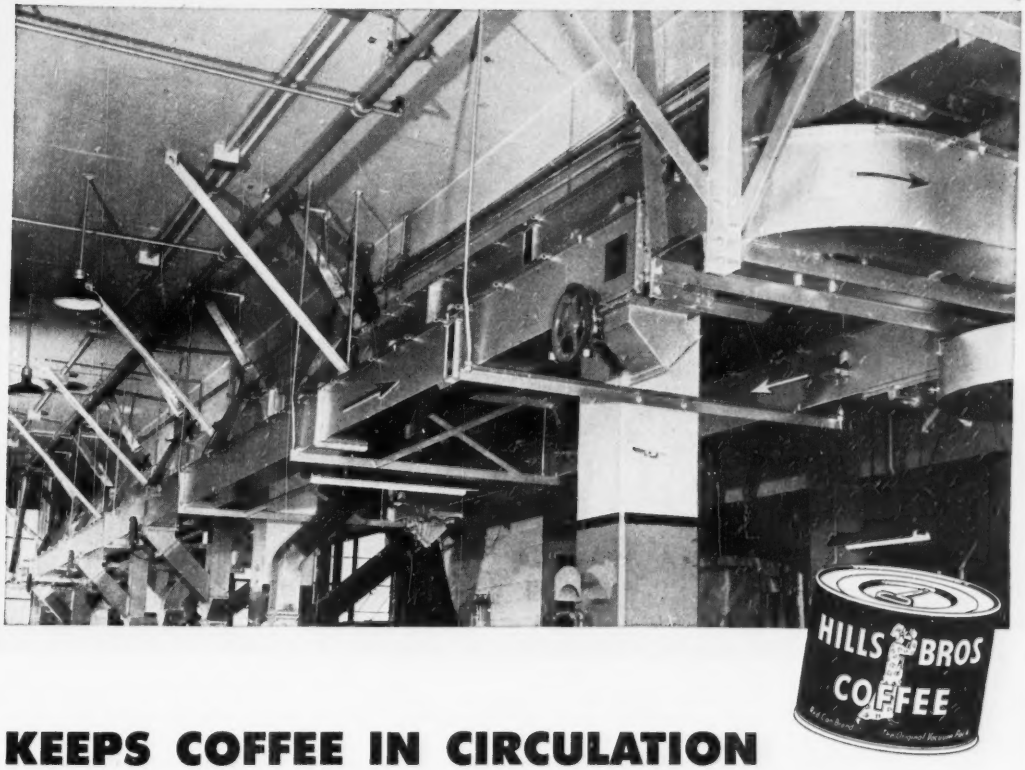

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For the job of delivering the right amount of coffee at the right time to processing and packaging machines, two REDLER conveyors were recommended by S-A engineers. REDLERS keep coffee clean, and free from spillage. Designed to recirculate coffee not immediately needed by machines, these REDLER conveyors fit compactly into minimum space.

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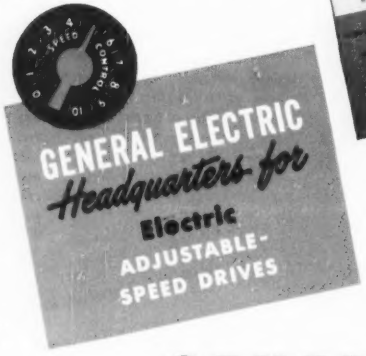

For the food processing industries—especially baking, meat packing, canning and preserving, grain milling, beverage bottling, and sugar refining—better control of drive speeds pays big dividends. Now, from General Electric's broad line of packaged electric adjustable-speed drives, you can select what you need for every food-processing operation.

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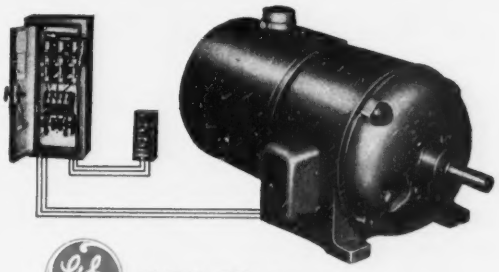

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FOR WIDER SPEED RANGES

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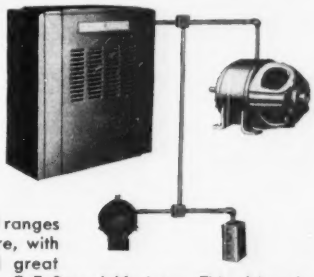

When you want speed ranges up to 16 to 1 or more, with good regulation and great flexibility, choose the G-E Speed Variator. This drive, in ratings from 1 to 60 hp, provides an economical method of converting from batch to continuous processing, by enabling you to remotely control proportional mixing of ingredients to obtain a standardized, uniform-quality product. See Bulletin GEA-5335.

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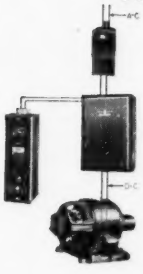

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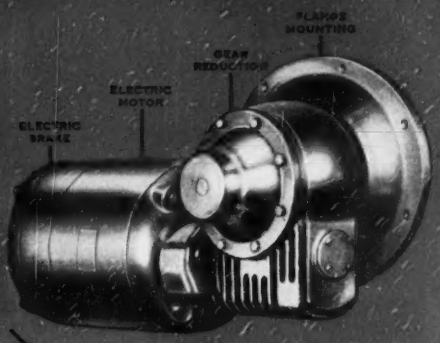
CHEVROLET



The power drives on this machine incorporate an electric motor, a gear reduction, an electric brake and a flange mounting . . . all standard Master units that easily combine into one compact, integral power-package that's just right for this machine. This permits many parts to be stripped away from both the power unit and the completed machine . . . makes a job that's all muscle, no fat.

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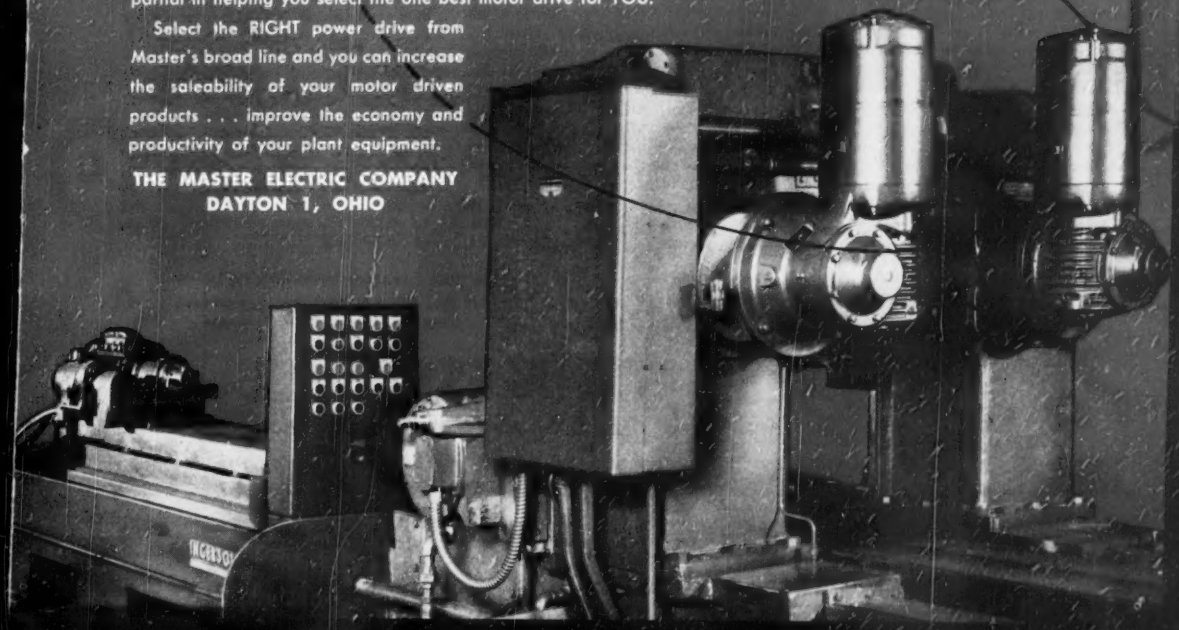

FABRICATED ENTIRELY from U·S·S Stainless Sheet and Strip, this continuous-belt cracker oven, made by the Arthur Blank Corporation, Los Angeles, is 120-feet long. A total of 94 heating units, top and bottom, insure thorough baking of both sides of the soda crackers.

Soda Crackers don't get rusty when ovens are Stainless Steel

TO the layman the connection between soda crackers and rust seems rather remote . . . but to the bakery it presents a definite operational hazard. That's because such highly corrosive combinations of steam, carbonic acid and ammonia gas are expelled during the baking of many types of biscuit plant products. The resulting corrosion inside the oven often ruins the product with flakes of rust.

The Arthur Blank Corporation, Los Angeles, overcomes this problem in its "band type" cracker ovens by building them entirely from Stainless Steel.

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That's because this perfected, service-tested Stainless is available to him in the widest variety of forms . . . sheets, strip, plates, pipe, tubes, wire . . . as well as a complete range of types and finishes. This permits him to use the widest latitude in equipment design and to employ the most modern techniques of fabrication.

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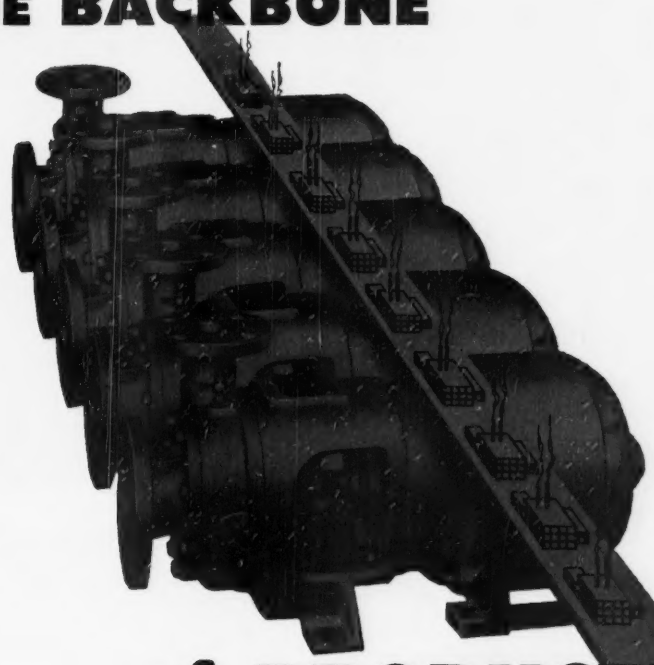
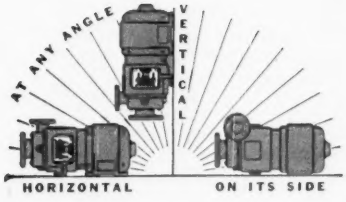
UNITED STATES STEEL

THE BACKBONE



# of PRODUCTION

the Ingersoll-Rand MOTORPUMP



No matter what the processes in your phase of manufacture, there undoubtedly are pumps involved . . . pumps that are the backbone of your production. When you think of pumps in this light, dependable pumps mean continuous production.

When you talk about dependable close-coupled pumps you're talking about the INGERSOLL-RAND MOTORPUMP line. There are hundreds of sizes and models available to meet a multitude of conditions. These are compact, self-contained units built for heavy-duty service.

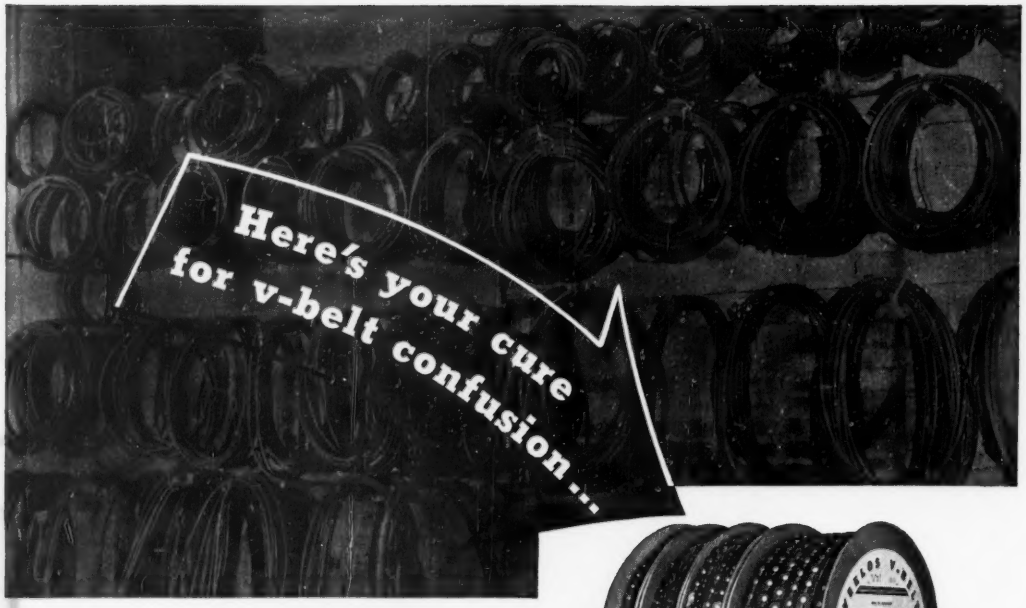
Each MOTORPUMP is just what the name implies . . . an electric motor and pump combined. Special motors are equipped with extra-heavy shafts and bearings. The pump with balanced impeller is assembled directly on the motor shaft. This compact construction gives perfect balance, vibrationless operation and extreme rigidity. The MOTORPUMP involves no large installation cost because it requires no special foundation, will operate efficiently in any position, horizontally, vertically, at any angle or on its side. Sizes ¼ to 40 horsepower . . . gallons to 1800 per minute . . . heads to 600 feet.

You can depend on Ingersoll-Rand MOTORPUMPS to ease your pumping headaches. Factory trained pump specialists from coast to coast are always ready to help you and can give you prompt shipment.

COMPRESSORS
TURBO BLOWERS
OIL & GAS ENGINES
PUMPS
CONDENSERS
AIR TOOLS
ROCK DRILLS

Ingersoll-Rand

Cameron Pump Division 423-9
11 Broadway, New York 4, N. Y.



4 reels of VEELOS can replace 316 sizes of endless v-belts

HAS your v-belt inventory grown too large, too costly and too complicated by too many sizes of endless v-belts? No matter what size your inventory, Veelos can cut it—drastically!

Let's assume that you use O, A, B and C widths. With only four reels of Veelos you can make up more than 316 sizes of endless v-belts. If you use only A and B sizes, your entire v-belt inventory will be complete with just two reels. Any length belt is quickly uncoupled from a reel, made endless and installed.

Ease and speed of installing Veelos lowers machine downtime. On drives with outboard bearings, it is installed without moving the motor or dismantling the machine.

FREE VEELOS CATALOG shows how Veelos can bring many distinct v-belt advantages to your plant. See page after page of illustrations of Veelos at work in industry after industry. Full engineering data is given. Write for your free copy today.

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PA.

VEELOS
THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all standard sizes, fits all standard grooves. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 300 distributors throughout the country. Veelos is known as VEELINK outside the United States.

MY JOB IS TO *SPEED UP* YOUR PROCESS

"I am De Laval Centrifugal Force. I speed up many processes by making the separation or clarification step continuous. I substitute my centrifugal force for slower, inefficient methods — operations that once took hours I do **continuously** in a matter of seconds as a part of the process."

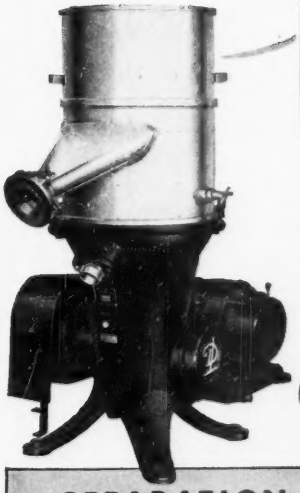
De Laval Centrifugal Force is put to work in many different types and sizes of machines.

For Example . . .

. . . DE LAVAL YEAST SEPARATOR

Separates yeast from wort at highest capacities. If the concentration of yeast fermented liquor fed to the "Nozzle-Matic" Separator is 5½ to 6% (compressed basis), the concentration after centrifuging is 50 to 60% or more.

The Yeast Separator is a special application. In general, De Laval machines continuously separate two liquids of different specific gravities and remove small quantities of solids from one or both liquids.



THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval **CONTINUOUS** *CENTRIFUGAL* **PROCESSING**

SEPARATION · CLARIFICATION · CONCENTRATION

you get

SPARKLE plus

locked in flavor and freshness

with packages of

ALCOA

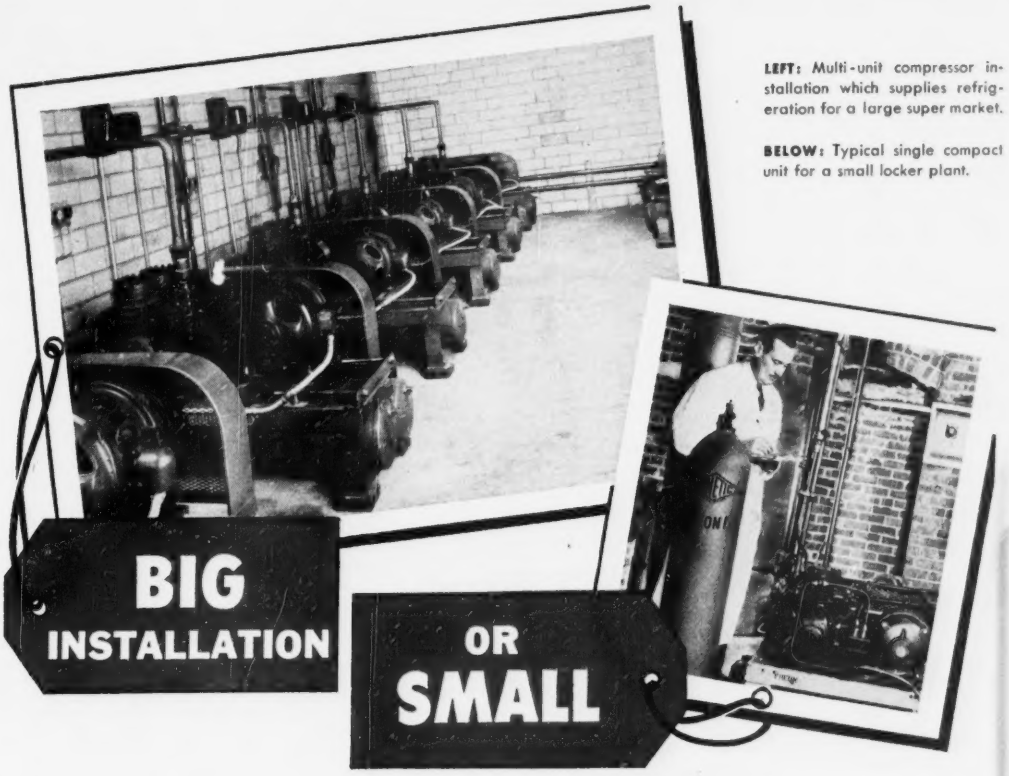
ALUMINUM FOIL

The sparkling Aluminum Foil wrapper* on this Brach's Mint Bar makes it a standout at the point of sale. And for protective qualities, here's what the manufacturer says: "Brach's... freshest bars on the counter! Bright foil wrappers protect their extra goodness."

Interested? We'd be glad to furnish you the names of leading package manufacturers, experienced in designing better packages using Alcoa Foil. Just write ALUMINUM COMPANY OF AMERICA, 1763B Gulf Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM

*Wrapper manufactured by Milprint Corp., from Alcoa Aluminum Foil



LEFT: Multi-unit compressor installation which supplies refrigeration for a large super market.

BELOW: Typical single compact unit for a small locker plant.

YOUR FROZEN FOODS ARE SAFER WHEN "FREON" REFRIGERANTS ARE USED

Whether your interest in the frozen food business requires a large or small refrigerating operation, you can assure maximum safety and protect your investment by selecting equipment designed to utilize "Freon" safe refrigerants.

"Freon" safe refrigerants cannot contaminate foods. Even if a leak developed in the system, it would cause no damage . . . no loss of frozen food stocks. These refrigerants are nontoxic, nonflammable, nonexplosive, noncorrosive and practically odorless.

In addition, the purity of "Freon" safe refrigerants and their freedom from moisture help prevent breakdowns in refrigerating systems. These refrigerants contain no acids or impurities which might corrode operating parts or react unfavorably with lubricating oils. And their dryness (less than ten parts of moisture in a million parts of "Freon-12") reduces risk of freezing capillary tubes and valves.

All these features of "Freon" safe refrigerants help safeguard your investment . . . help prolong the economical operating life of the refrigerating system. That is why it is a good plan, when discussing proposed installations, to ask your consulting engineer or equipment manufacturer about "Freon." They will gladly recommend suitable systems that operate with "Freon" safe refrigerants for big installations or small.

KINETIC CHEMICALS, INC.
Tenth and Market Streets
Wilmington 98, Delaware

KINETIC
FREON
SAFE REFRIGERANTS

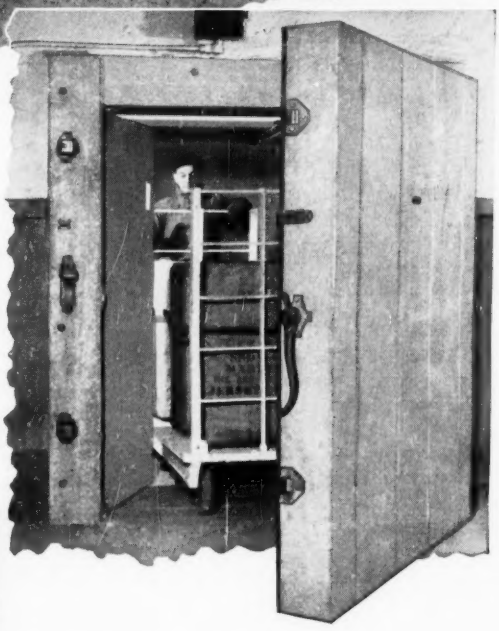
"Freon" is Kinetic's registered trade-mark for its fluorinated hydrocarbon refrigerants.

LARGE OPENINGS PERMIT USE OF TRUCKS

Speedy handling in and out of storage is possible by use of trucks that pass in and out of the large openings equipped with equally large Jamison-built doors.

FROZEN ORANGE JUICE COMING FROM -10° F.

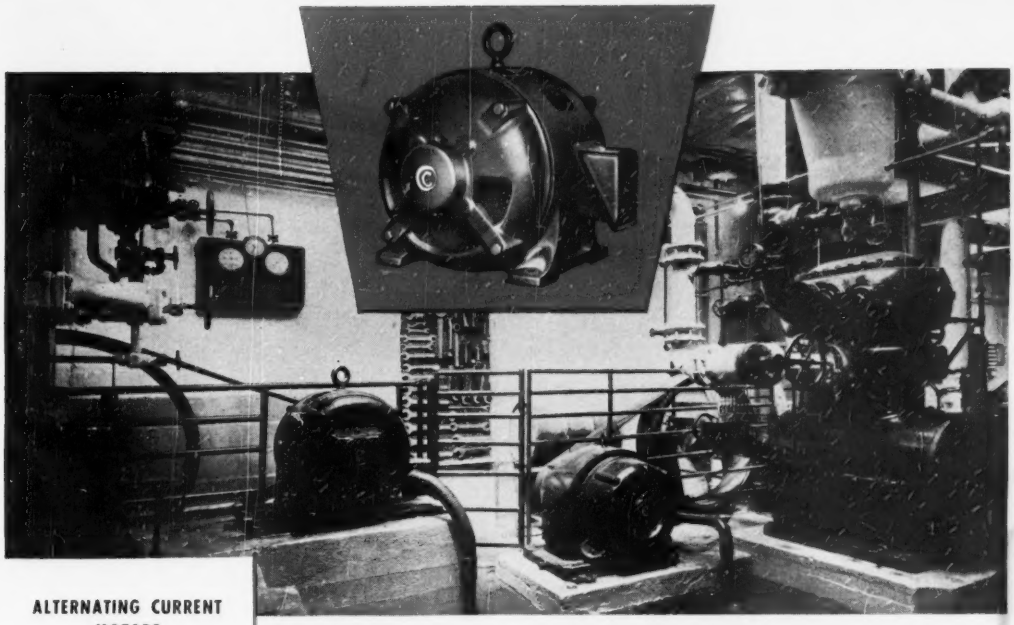
The vestibule doors swing open to leave a truck load of frozen orange juice pass through. The overlap type Super Freezer Door is metal clad and is equipped with two Jamison E-Z-Open Fasteners.



JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

The oldest and largest builder of cold storage doors in the world

JAMISON COLD STORAGE DOOR CO. • HAGERSTOWN, MD., U. S. A.



Century 100 horsepower and 125 horsepower type SCH motors driving refrigeration compressors. Also in this room are 3 Century 75 horsepower motors which have been operating more than 15 years without a shutdown.

ALTERNATING CURRENT MOTORS

POLYPHASE

Squirrel Cage Induction — ⅛ to 400 H.P.
Wound Rotor Motors — 1 to 350 H.P.
Synchronous Motors — 20 to 150 H.P.

SINGLE PHASE

Split Phase Induction — ⅛, ¼, ⅓ H.P.
Capacitor — ⅛ to 20 H.P.
Repulsion Start, Brush Lifting, Induction — ½ to 15 H.P.

DIRECT CURRENT MOTORS

⅛ to 300 H.P.

GENERATORS

AC, 500 Watts to 300 KVA
DC, 250 Watts to 200 KW

MOTOR GENERATOR SETS

AC to DC, AC to AC
DC to DC, DC to AC

Open Protected, Splash Proof, Totally Enclosed Fan Cooled, Explosion Proof

Ball Bearing motors are factory lubricated for several years' normal service. Bearing housing construction permits easy re-lubrication when unusual service demands it.

For Operating Your Refrigeration Compressors

SPECIFY Century TYPE SCH MOTORS

with HIGH STARTING TORQUE and LOW STARTING CURRENT

Century type SCH, squirrel cage motors are the ideal power supply for refrigeration compressors because they have the ability to start heavy loads with low starting current.

This means that it is never necessary to over-motor the compressor to get the starting torque needed. In fact, compared to a general purpose motor, it is often possible to substitute a Century type SCH high starting torque motor of the next lower horsepower rating.

In addition, Century motors are known for their ability to operate smoothly and quietly throughout their long service life. They are built in a wide range of types, in sizes from ⅛ to 400 horsepower for every refrigeration, air conditioning and air circulating requirement.

Popular types of standard ratings are generally available from factory and branch office stocks.

CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

SPECIFY Century C MOTORS for all your electric power requirements

-650

90% PURE
MONOESTER CONTENT

—a new food that more smoothly unites good things to eat

A *dependably uniform*, plastically soft food fat that is more than *90% surface-active monoglyceride* is now available in quantity. It is made from refined cottonseed oil.

That unique 90% monoglyceride content gives Myverol Distilled Monoglycerides, **Type 18-85,** remarkable emulsifying effectiveness in comparison with 30% to 40% monoglycerides.

You'll find that a dough or batter requires a *small fraction of the quantity of previously available monoglycerides you've been using*. If you manufacture shortening, you'll be astonished at savings on overage you can now avoid because Myverol Monoglycerides—*taste-free, odor-free, catalyst-free, soap-free*—can be added directly to your deodorized product.

Like to make up a trial batch of your product with it? Like to work out the arithmetic with respect to your product picture? We'll be glad to send you a sample, price quotation, and specification sheet.

"MYVEROL" IS A TRADE-MARK

DPi

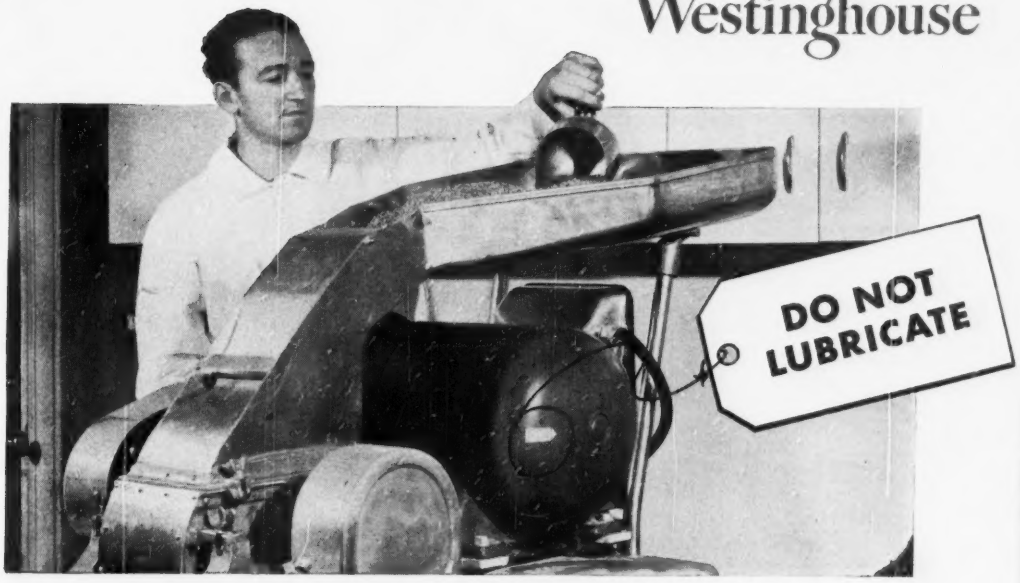
DISTILLATION PRODUCTS *industries*

723 Ridge Road West, Rochester 3, N. Y.
Division of Eastman Kodak Company
570 Lexington Avenue, New York 22, N. Y. • 135 South La Salle Street, Chicago 3, Ill.
Gillies & Loughlin, Los Angeles and San Francisco
Charles Albert Smith, Ltd., Montreal and Toronto

Distillers of Oil-Soluble Vitamins and Other Concentrates for Science and Industry; Manufacturers of High Vacuum Equipment

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



A THOUGHT FOR FOOD:

No Dripping Grease

Never grease a Life-Line motor. Install it and forget it. That's because Life-Line prelubricated bearings have the grease sealed in. Cleanliness is assured. There are no dirt-accumulating cavities . . . no grease cups and fittings . . . no dripping grease to contaminate food.

What's more, product performance records show Life-Line motors, with prelubricated bearings, average 41% fewer bearing failures than the *best conventional-type motor* ever built by Westinghouse. Results of an extensive survey indicated a yearly savings—from lubrication alone—of $270 per year per 100 motors.

But, bearings are only part of the story. Life-Line's sleek all-steel design is easy to keep free of accumulating dust . . . is easy to keep clean. In fact, you'll find Life-Line makes "good housekeeping" very easy.

Get the facts of this complete line of motors—totally-enclosed, fan-cooled, drip-proof, splashproof and sanitary motors. Ask your nearby Westinghouse representative for complete facts on Life-Line or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21561

---- *If you figure* **LIFE COST** *. . you'll figure* **LIFE-LINE** ----

Westinghouse *Life-Line* Motors

INDUSTRY'S LEADING MOTOR

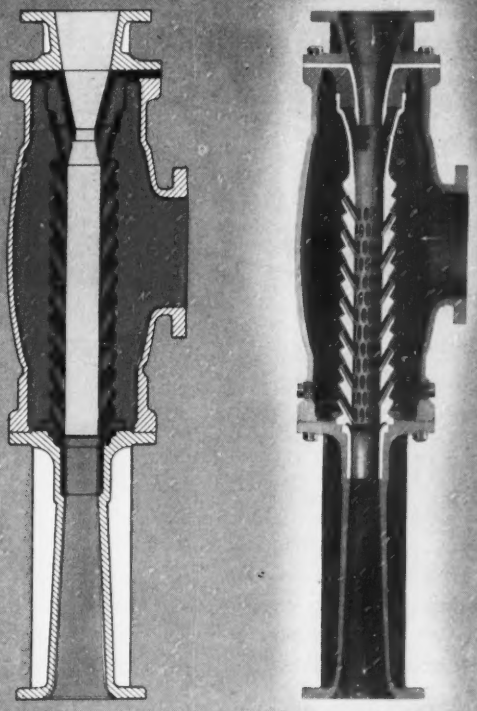
Artist – Herald G. Miller, native of Utah

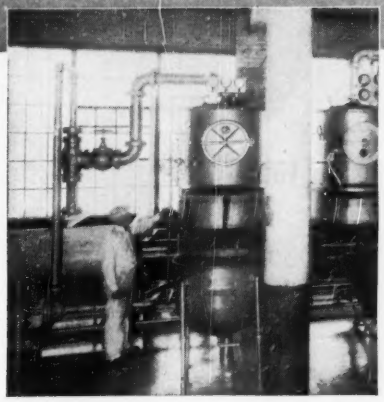
UTAH – *annual purchases: $620 million, mostly packaged.*

CONTAINER CORPORATION OF AMERICA

Get...

THEN FORGET THIS EDUCTOR CONDENSER





Three SK Eductor Condensers, only one of which is shown, are used on vacuum kettles in the food manufacturing plant above.

The SK Eductor Condenser has no moving parts to get out of order, adjust or repair. It's simply designed to require minimum maintenance and insure efficient operation in various processes requiring medium or high vacuum. You can install it and then forget it.

In operation, the injection water is delivered to the top inlet of the condenser at a constant pressure of 10 lbs. which, combined with the internal vacuum, produces sufficient jet energy to discharge the water through the tail diffuser against atmospheric pressure. The water jet condenses the steam, entrains the non-condensible gases and discharges the mixture into a hotwell tank without the use of an external vacuum pump.

Ideal for use with small engines or turbines and in process operations in the food, chemical and refinery fields, SK Eductor Condensers are made in sizes ranging from 1½" to 10" inclusive.

You can get full details on construction and operation by requesting Bulletin 5-B.

SCHUTTE and KOERTING Company

Manufacturing Engineers

1157 THOMPSON STREET • PHILADELPHIA 22, PA.

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS • FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

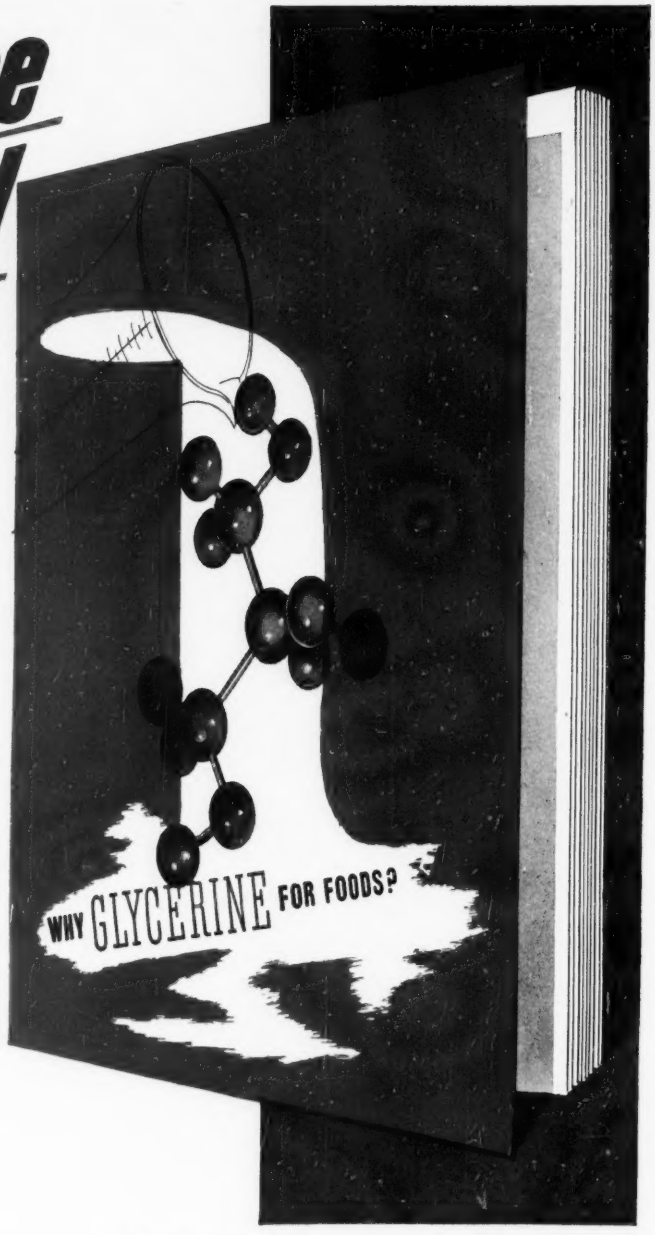
First Time Offered!

a practical review of GLYCERINE applications in Foods—

WHERE? . . . How? . . . Why? . . . If you're looking for the answers to these questions on glycerine usage in food processing—here's the most up-to-date information available!

"Why Glycerine for Foods?" has been reviewed by a number of technical consultants as well as the Research Laboratories of the Glycerine Producers' Association. Contains detailed information by charts and tables of the physical properties of glycerine—the origin, development, and chemistry of this amazingly useful alcohol—grades and their applications. 16 pages of practical, useful data!

Whether you now use glycerine or just wonder about its possibilities . . . whether you're in management, production, or research . . . an expert on glycerine, or thoroughly unfamiliar with the subject—you'll want this informative booklet. Write for your free copy—today! *Address: Dept. 8, Glycerine Producers' Association, 295 Madison Avenue, New York 17, New York.*



One of a series of five booklets on the industrial applications of glycerine. Also available on request: Why Glycerine? (a general survey of all main uses) . . . Why Glycerine for Alkyd Resins and Ester Gums? . . . Why Glycerine for Drugs and Cosmetics? . . . Why Glycerine for Textiles?

GLYCERINE PRODUCERS' ASSOCIATION

295 Madison Avenue, New York 17, N. Y.

A WHOLE NEW CONCEPT OF INSTRUMENTATION IS REVOLUTIONIZING THE FOOD INDUSTRY FROM COAST TO COAST!

BREWMEISTER GOES MODERN... SAVES STEPS WITH THE *ElectroniK* MULTIPLE RECORDER

THE age-old art of brewing is turning to exacting control . . . to keep quality uniform and profits high.

Part and parcel of the modern Blitz-Weinhard Brewery in Portland, Oregon, is the Brown *ElectroniK* Multiple Recording System. Pictured is Assistant Brewmeister E. Mitlehner as he checks the recorder for temperature conditions all over the plant. A continuous record is kept for such remote points as fermenting rooms and cellars, storage rooms and hop rooms. Temperatures are accurate and recording is fast . . . the strip-chart form is ideal for filing. Located on the office wall, the instrument saves countless steps . . . helps the Brewmeister take a trip around the plant in a matter of seconds.

Brown creative instrumentation is setting new, high standards in efficiency and economy throughout the Food Industry. Call in your local Honeywell engineer for a discussion of your control needs . . . he is as near as your phone.

COMMERCIAL • RESIDENTIAL • INDUSTRIAL
WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL

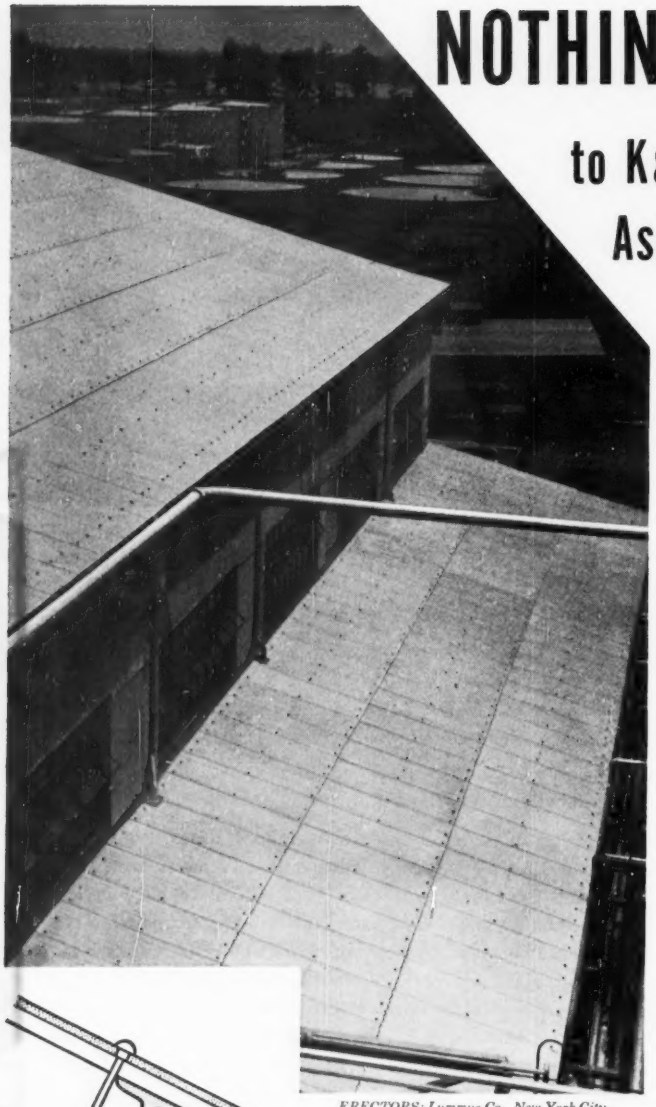
Creative instrumentation is the engineered application of cost-reducing instruments and controls.

MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION
4502 Wayne Ave., Philadelphia 44, Pa.
Offices in 73 principal cities of the United States, Canada and throughout the world

MINNEAPOLIS Honeywell — *Creative Instrumentation* FOR THE FOOD INDUSTRY — BROWN INSTRUMENTS

NOTHING HAPPENS

to K&M *"Century"* Asbestos Corrugated



ERECTORS: Lummus Co., New York City.

Here you see it used for both the roofing and siding on this Shell Oil Company building at Deer Park, Texas. Don't ever expect to see it hurt by the weather or other adverse atmospheric conditions. Count on it to go rustless and rotless. It won't suffer from rodents and termites, and is exceptionally resistant to fire.

Easily cut and fitted on the job, K&M "Century" Asbestos Corrugated produces tight, good-looking surfaces at minimum labor cost. For extra savings use "TOP-SIDE"* fasteners, as on this Shell building. They entirely eliminate scaffolding and are only available with K&M "Century" Asbestos Corrugated.

Your finished job will benefit by the inherent structural strength of this material which actually gains strength with age. As for upkeep, you needn't figure on even one bit of paint!

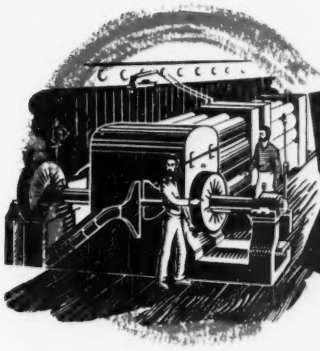
*® H. & B. Enterprise Corp.

"TOP-SIDE" FASTENERS are made in various types, to fit all steel members on both roofing and siding. Illustration of typical "J" type for roofing.

Nature made Asbestos...
Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA



BACK IN THE 1880's

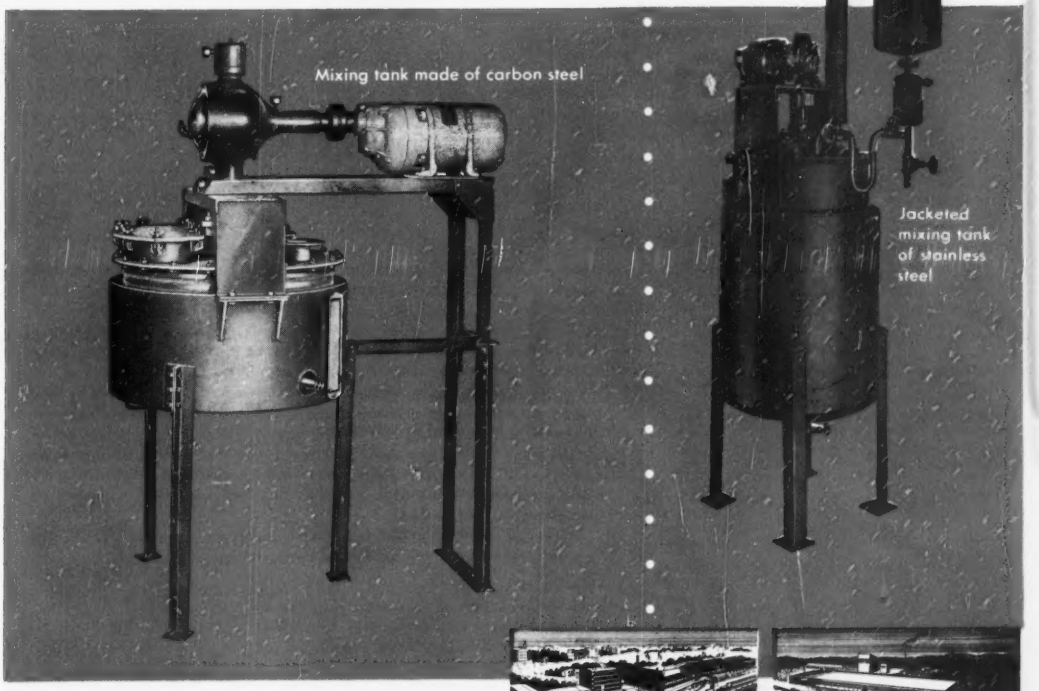
WHEN EDISON INSTALLED
THE FIRST COMMERCIAL
GENERATING PLANT

Koven

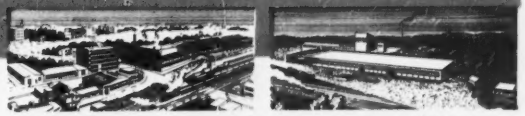
WAS MAKING INDIVIDUALIZED
FOOD EQUIPMENT

Through the years, leaders in the food field have depended increasingly on KOVEN individualized food equipment to make production more efficient and less costly. Each KOVEN unit is designed and built to meet the requirements of a specific need. Call or write for a KOVEN representative—no obligation. Facilities in our two vast plants include: Machine, welding, painting and galvanizing shops. X-ray inspection insures quality control.

Among the many KOVEN products in all commercial and non-corrosive metals: Stainless Steel; Aluminum Sheet Fabrication; Boxes; Tote; Waste Cans; Chemical Apparatus; Coils and Pipe Bands; Copper Sheet Fabrication; Galvanizing Work; Mixers, All Kinds; Monel Metal Fabricators; Pails, Sinks, Scullery and Factory; Tables; Galvanized or Monel; Tanks, All Types, All Metals; Kettles, All Types, All Metals.

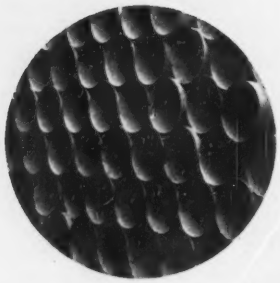


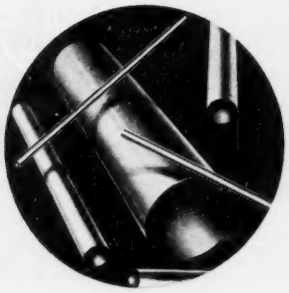
L. O. KOVEN & BRO., Inc.
154 Ogden Ave., Jersey City 7, N. J.

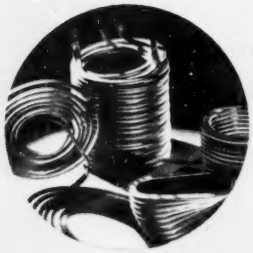


Plants: Jersey City, N. J. Dover N. J.

KOVEN FOR INDIVIDUALIZED FOOD EQUIPMENT SINCE 1881







full finished tubing
stainless steel pipe
large diameter tubing
ornamental tubing
beverage tubing

TRY TRENTWELD!

Whatever your tubing requirements . . . pressure tubing, stock line tubing, cooling coils . . . TRY TRENTWELD! Trent Tube Company specializes in the production of stainless and high alloy tubing. All mill facilities are designed to produce tubing that offers rugged dependability, long life and economical service. These features coupled with the many advantages of stainless steel tubing make TRENTWELD ideally suited for use in your application.

You're assured of quality because TRENTWELD is made in a *tube* mill by *tube* engineers. You're assured of proper application, because as tube specialists, Trent can show you how to apply TRENTWELD to your application . . . better! You're assured of finding what you need, because the complete TRENTWELD line ranges from ⅛" to 30" diameter inclusive. You're assured of prompt delivery, because Trent's mid-continent location makes every industrial area easily accessible by train, plane, boat or truck.

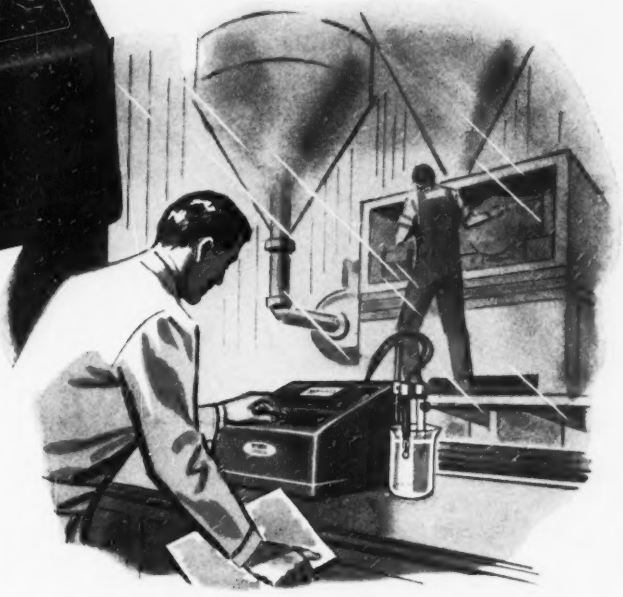
To meet your stainless or high alloy tubing requirements . . . TRY TRENTWELD! One word from you puts our experience at your call.

TRENT TUBE COMPANY
Subsidiary of Crucible Steel Company of America
General Offices and Plant: East Troy, Wisconsin
Sales Offices: Chicago—4501 W. Cortland St.
New York—Chrysler Building

TRENTWELD

STAINLESS STEEL TUBING

In virtually ALL phases of Food Processing BECKMAN pH CONTROL is making vital savings like these . . .



THE BECKMAN MODEL H-2 pH METER is one of a complete range of Beckman pH Meters available for every type of application*. The H-2 is particularly recommended for applications where high accuracy and simple operation—combined with the convenience and low cost of 115-v. AC operation—are desired.

It provides instant and direct pH readings, and a simple, built-in dial permits quick, convenient temperature compensation over the entire range of 0° to 100°C (32° to 212° F.). High reading accuracy is assured by wide-spread dual range scale that reads from 0 to 8 pH or from 6 to 14 pH at the turn of a switch. Same switch also provides instant millivolt readings from 0 to ±800 mv and from ±600 to ±1400 mv for titrations and oxidation-reduction measurements.

Built-in electrode support and compact case design save valuable space and permit easy portability to various plant locations.

Particularly important is the wide range of factory-sealed, maintenance-free Beckman Glass Electrodes available for use with this instrument . . . electrodes that are virtually unbreakable . . . that cover extreme temperature ranges from below freezing to above boiling . . . that have an unprecedented pH range with negligible errors . . . that are abrasion-resistant and chemically durable to a degree never before thought possible in glass electrodes.

*In addition to the H-2 Meter, other Beckman pH equipment includes completely automatic pH indication and control instruments for large-scale process applications . . . battery-operated models for complete portability in plant and field use . . . and a laboratory type instrument that features maximum versatility and accuracy for research and laboratory applications

Throughout the food industry—in baking, canning, sugar refining, brewing, milk processing and a wide range of other operations—cost-conscious operators are making important savings by Beckman-controlling the pH of their processes. Some of the many benefits resulting from Beckman pH Control include:

. . . better quality, greater uniformity, fewer rejects in the baking of crackers, bread and other bakery products.

. . . improved fermentation control in brewing, wine making and distilling processes.

. . . better quality and flavor in a wide range of dairy processing and cheese making operations.

. . . more accurate control of flavor and quality, better jel consistency, in jam and jelly making.

. . . improved sterilization, flavor and quality in various canning and preserving operations.

. . . and valuable savings in time and processing costs in many other food processing operations.

If you have not yet investigated the savings Beckman pH Control can make in your particular food processing operations it will pay you to discover what others—possibly your own competitors—are doing to cut costs, improve quality and enhance flavor and marketability with the aid of Beckman pH Instruments.

The Beckman Model H-2 pH Meter illustrated above is ideal for most food processing plants because of its high accuracy, its inexpensive AC operation and its simple direct-reading convenience. Let our trained engineers show you how this instrument can quickly pay for itself and produce year-round savings in your operations. For further details see your nearby authorized Beckman dealer—or write direct. **Beckman Instruments, National Technical Laboratories, South Pasadena 18 Calif.**

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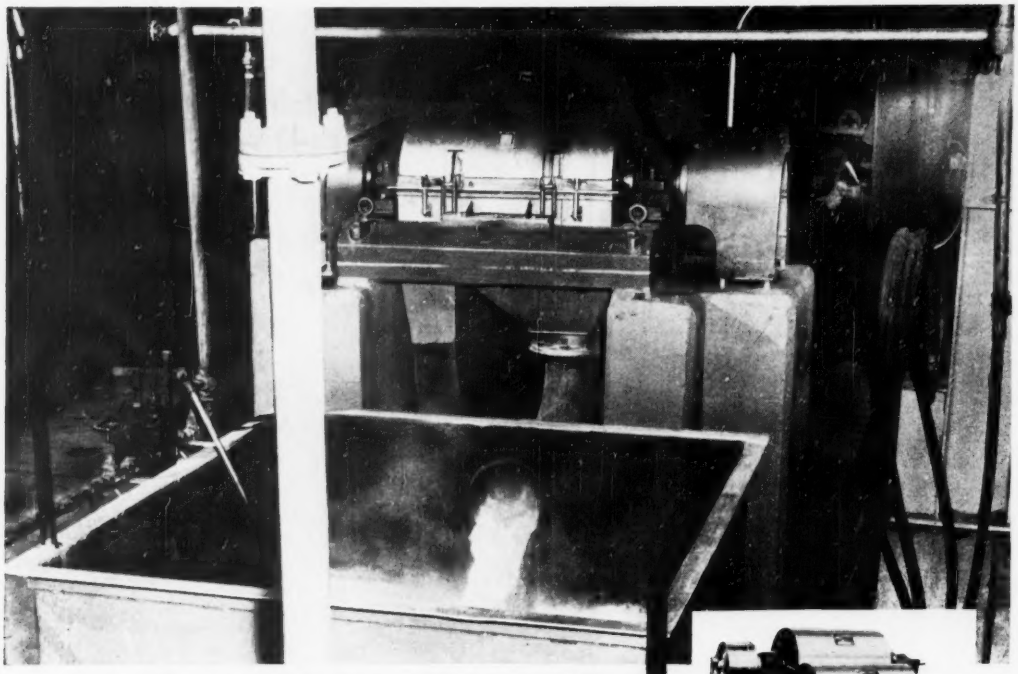


IT STEALS MONEY FROM THE SEWER

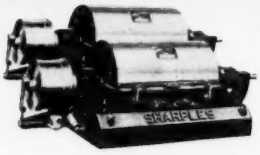
Many plants have needlessly accepted the loss of valuable solids in waste water and process liquors—believing them to be uneconomical to reclaim. The plant shown above formerly was one of them.

TODAY, continuous super filtration provided by the Sharples Super-D-Canter is not only removing solids economically, but it is doing so at a substantial profit.

In addition to removing solids, the Sharples Super-D-Canter is used for the clarification of liquids, or it is adjustable for use as a classifier: removing solids within a set size range.

The Super-D-Canter is continuous; both in the discharge of liquids and the discharge of solids. It can handle a wide range of slurries and do a better separating job because it develops the highest centrifugal force of any centrifuge of this type.

Complete information will gladly be sent to you.



TWO BASIC TYPES

The two types of Sharples Super-D-Canters provide for the successful handling of practically any slurry. Depending on individual characteristics, solids may range from 1% to above 50%.

The Sharples *Conical* Super-D-Canter is used for firm-bodied type solids; while the *Cylindrical* Super-D-Canter is especially designed for soft and amorphous, extrudable-type solids.

Since the Sharples Corporation manufactures *the complete line* of all centrifugals, you can always be assured that their recommendations are impartially based on the best fulfillment of your particular requirements.

THE SHARPLES *Sharples* **CORPORATION**

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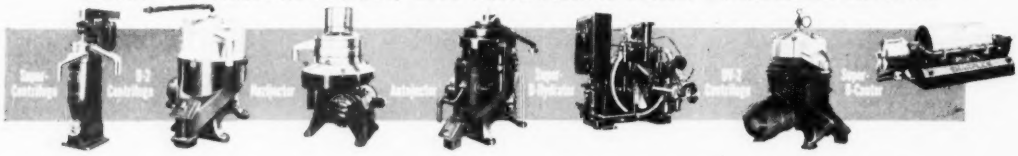
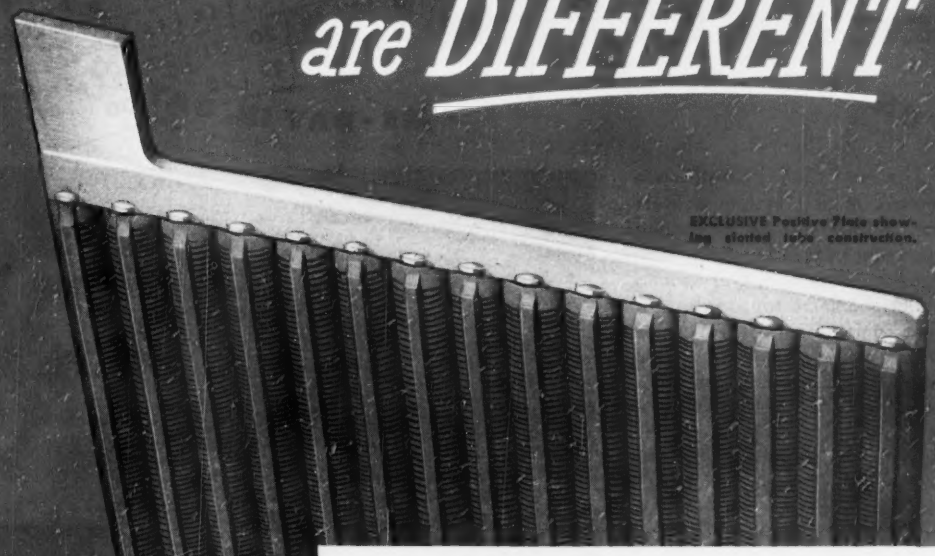
EXECUTIVE OFFICES AND FACTORY, 2300 WESTMORELAND STREET, PHILADELPHIA 40, PENNA.



EXIDE-IRONCLAD PLATES *are DIFFERENT*



EXCLUSIVE Positive Plate showing slotted tube construction.

The famous and exclusive Exide-Ironclad positive plate is the result of sixty-two years of battery-building experience. During that time we have learned much about the design and construction of every type of battery for every application. Development work never ceases in improving the performance of Exide-Ironclad Batteries. Our research staff is the largest in the industry. Engineers, chemists, metallurgists, physicists, technicians and their aides, equipped with all the necessary tools and devices, are constantly building and testing various types and kinds of plates and assemblies.

We have yet to find a positive plate with all the desirable characteristics of the Exide-Ironclad for use in battery electric industrial trucks. Further proof of its superiority is supplied by long service records in thousands upon thousands of installations.

Exide-Ironclad Batteries provide high power ability, high electrical efficiency, ruggedness, long life, minimum maintenance. The combination of these Exide-Ironclad characteristics assures years of dependable day-in, day-out service . . . *at lowest cost.*

THE ELECTRIC STORAGE BATTERY CO.
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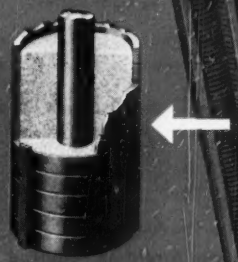


Enlarged cutaway view of section of tube containing active material. So small are the slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose.

1888 . . . DEPENDABLE BATTERIES FOR 62 YEARS . . . 1950

"Exide-Ironclad" *Reg. Trade-mark U.S. Pat. Off.*

UNIFORM Batter Mixing- CONTINUOUSLY

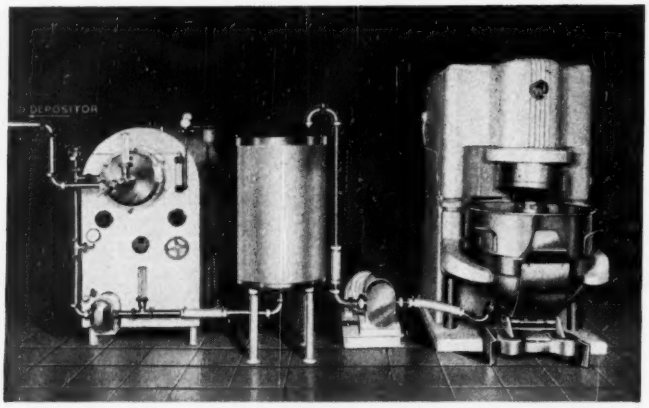
UNIFORM RESULTS EVERY TIME - DAY IN, DAY OUT

The AMF Oakes Continuous Automatic Mixing System delivers batter UNIFORMITY by eliminating the variations caused by the human factor in batch mixing. Every pound of material going through the mixer has the same amount of work done on it. This results in uniformity of the finished batter for every minute's operation. There is no varying floor time until the batter goes into the pan. With a master floor switch, the depositor operator keeps a uniform level in the depositor. This helps maintain batter uniformity through the depositing operation.

The liquid shear principle of its mixing operation so finely disperses the ingredients and air throughout the batch that there is greater stability in the batter.

The AMF Oakes System eliminates pushing of bowls from mixing room to depositor, unloading, and cleaning bowls from each batch.

For literature and complete specifications write to Mr. B. L. Ahrens, American Machine & Foundry Co., 485 Fifth Avenue, New York 17, N. Y. or to Mr. Charles L. Clock, West Coast Sales and Service Headquarters—1258 Mission Street, San Francisco 3, California



AMF OAKES MIXER ⬅ STORAGE TANK ⬅ PUMP ⬅ AMF GLEN MIXER

Typical Glen Oakes layout. Other one- and two-floor combinations, can be made to suit your plant layout

QUICK CHANGEOVER from one type of batter to another meets every demand of the baker for VARIETY in cake production. It is ***not necessary*** to have long continuous runs to use the Oakes efficiently.

It takes less than 2 minutes to change over the Oakes from sponge to pound or from pound to chocolate batters.

It takes only 15 minutes from the time you stop depositing chocolate batter until you start depositing light batter.

VARIABLE CAPACITY. Production is variable from 500 to 4,000 lbs. per hour according to the capacity of your ovens. A single foot pedal controls the flow into the depositor.

One man with automatic equipment for scaling flour and sugar can scale, pre-mix and deliver to the depositor 3,600 lbs. per hour. (Without automatic scaling, 3,000 lbs. per hour.)

ADDITIONAL FEATURES

1. **Better Quality**
2. **More stable mix**
3. **Greater Yield**
4. **Better Keeping Quality**
5. **Big Production**
6. **Little Attention required**
7. **Sanitary . . . Easily cleaned**
8. **Less Maintenance**

OAKES CONTINUOUS AUTOMATIC MIXER

DESIGNED BY NATURE

DESIGNED BY UNITED

The walnut is a good example of protective design in Nature. UNITED packages are planned to give the best possible protection to your product. UNITED packages are specifically designed and engineered for your needs.

UNITED *Packages are:*

* *labor saving*	*set up quickly*
* *skillfully engineered*	*product recognition*
* *time saving*	*fill freely*

WRITE, WIRE OR PHONE UNITED TODAY, WE ARE READY TO SHOW YOU WHY

IT PAYS TO PACKAGE WITH UNITED

UNITED BOARD & CARTON CORPORATION

Folding Cartons and Package Specialties • From Pulp to Finished Product

P. O. BOX 1318, SYRACUSE, NEW YORK

CARTON PLANTS: VICTORY MILLS, SYRACUSE, COHOES, BROOKLYN, N. Y., SPRINGFIELD, O.; BOARD MILLS: LOCKPORT, THOMSON, N. Y., URBANA, O.

When you want the BEST go to the BEST

And for Packaging it's GLASS

The transparent glass package displays your products with all their colorful eye and appetite appeal. Inert, it does not change their taste or aroma, will not rust, corrode or leak. Easy to open, easy to use, easy to reseal to protect unused portions, it makes the most convenient package. It lends itself to individuality in size and shape, hence is adaptable to any product. Preferred by consumers because it is sanitary and convenient . . . by retailers because of its sales and merchandising advantages.

Anchor Hocking Glass Corporation, Lancaster, Ohio.

Anchorglass*

STUBBY ROUND BOTTLES

For packaging liquid food products—syrup, salad oils, juices and the like, you'll find that *Anchorglass* Stubby Round Bottles will step up production-line efficiency. They are tough and sturdy, designed to move uninterrupted through every packing operation. Consistency in manufacture, uniform distribution of glass, accurate and careful annealing, strict quality control from selection of raw materials to finished container—result in uniformly strong, durable bottles.

The Stubby Round Bottles illustrated are available in 10 capacities, from 4 oz. to 100 oz.—in crystal, amber or emerald green glass. But regardless of what you pack, there are *Anchorglass* containers in styles, capacities, and colors that will completely meet your requirements.

ANCHOR*

C. T. CAPS

Anchor C. T Caps give economical, dependable, leakproof sealing. They are adaptable for use on a wide range of products which require airtight and liquid-tight sealing. Their scientifically designed deep rolled thread improves holding qualities; permits ample clearance over the glass thread; prevents binding and gives spin-on action which results in fast, low-cost application. Deep, coarse knurls avoid interference with the top of the glass thread and permit free radial movement of the liner and provide a firmer gripping surface for application and removal. Housewives like the *Anchor* C. T. Cap because it's so easy to remove and replace and because it protects contents until entirely used. May we submit containers and closures for test purposes?

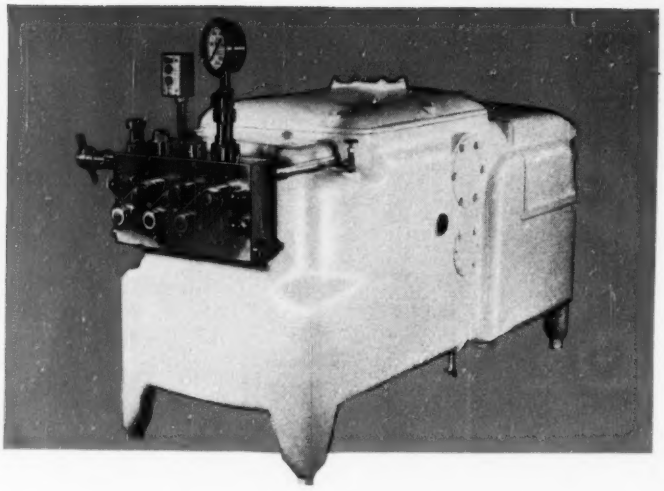
*Reg. U. S. Pat. Off.

For the BEST in Glass Packaging *it's*

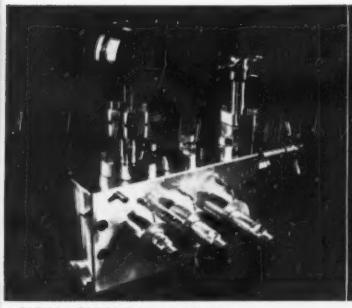
ANCHOR HOCKING

PACK IN "Anchorglass"... SEAL WITH "Anchor Caps"

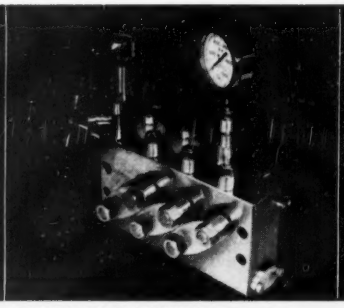
if you are now homogenizing or are considering it you should know about superhomo INDUSTRY'S MOST ADVANCED HOMOGENIZER



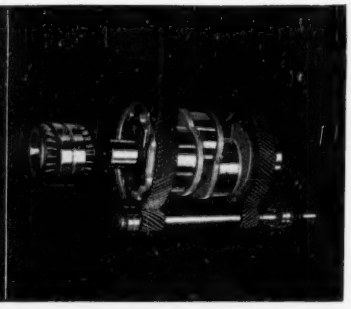
Today, more and more progressive food processors are homogenizing to gain a better tasting product — and greater profit. That's why, whether you are now homogenizing — or merely considering it — you should know about Superhomo — industry's most advanced homogenizer: Cherry-Burrell's Superhomo offers you exclusive, patented advantages over all other homogenizers. Here are a few of the features of this new trendmaker:



NEW CYLINDER BLOCK . . . is solid stainless steel for greater strength and sanitation. Easily cleaned, all parts are removed from front of block. Saves cleaning time.



NEW HOMOGENIZING VALVE . . . simple, efficient single or two-stage operation. Perforated, sanitary throw-away valve caps provide new homogenizing surface daily. These caps take 98% of wear . . . reduce valve regrinding.



NEW TWIN HELICAL GEARS . . . are extra wide and heavy for safety, longer life, and smoother operation. Timken roller bearings reduce friction. Lubrication is positive.

The Superhomo is made in sizes to fit all capacity needs from 50 to 2,500 gal. per hour (400 to 20,000 lbs. per hour). Find out today how you can homogenize — profitably! *Send for Superhomo Bulletin.*

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General Sales and Executive Office:
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Milk and Food Plant Equipment and Supplies
FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 56 CITIES

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Food Industries

Research Has Become Dominant Competitive Weapon

It is disturbing to learn that some food processors have curtailed research expenditures to save money. A sound research program is an investment in the future. It is a means of achieving lower raw material and operating costs on a long-range basis and often pays fabulous dividends. It finds profitable uses for byproducts. It is the only way to keep abreast of competition in respect to quality. Without it, new products cannot be put onto the market to revitalize sales—a vital factor, particularly in specialty industries where products often have a limited life span. And, of course, research is needed to solve processing problems.

It is difficult to say how much a particular processor should spend on research, but as a general figure 0.5 percent of annual sales is a reasonable sum. That is, a company which does a $300,000,000 business usually should put $1,500,000 into research each year.

One company recognizes that it must develop successful new products with some regularity, and it spends $25,000 to $1,000,000 to create a single successful new food. In ten years its research staff has increased from 149 to 349.

Eighty percent of food processing companies conduct research programs, and 63 percent of these maintain their own laboratories. In addition, the industry has contributed about $300,000,000 to support the work of the Nutrition Foundation in 55 universities and medical centers.

Some idea of the scope of research, and the need for each processor to protect his future by a research program, can be gained by considering the food studies underway in just one research institute. These include the production of edible fats from algae, the economics of nonreturnable containers, development of formulas and processing methods for new winter beverages, and formulas to increase the nutritive qualities of beverages.

But there are more: A formula for canned barbecued hams and the best method of preparation, consumer preference for different sweeteners in apple butter and frozen fruits and vegetables, and preferences tests for tea and certain canned foods.

And still more: A more economical method of canning, use of gases other than carbon dioxide in beverages, a liner for acid syrup shipping drums, improvement of peppermint oil, byproduct uses for mucic and saccharic acids, effect of soft water on food quality and a new cheap source of sugar.

If you multiply these projects a few-hundredfold, you will get some concept of the number and variety of problems under study. Then ask yourself whether you can afford to do nothing while your competitors find the answers to such problems.

Now, in planning research, keep a few basic principles in mind if you want results: (1) Select a specific project and define it well—in other words, tell your research personnel exactly what the problem is and what you want them to do about it. (2) Put the project in the hands of competent personnel equipped with adequate facilities. (3) Provide adequate financing—research costs money. (4) Give every aid and encouragement to the people doing the research. (5) Be patient—results usually don't come immediately.

Examples of big dividends from research are legion. But the value of research has been eloquently summed up by Dr. Erwin H. Schell, Professor of Business Management, Massachusetts Institute of Technology:

"Organized research has become the dominant competitive weapon . . . It is safe to say that within the next decade, the company which cannot introduce into its processing the new product, the new design, the new formula with as great facility as it introduces raw material into its process will be definitely obsolete from the point of competitive armament."

—F. K. LAWLER, *Editor*

Workers on these lines were selected by dexterity tests . . .

ON HAND-PACKING lines, girls must select spears of correct size and place them butts-up in container. Spears are supplied in boxes.

WORKERS on conveyorized hand-packing line select spears from belt instead of boxes. There is competition for spears of correct size.

Dexterity Tests Lower Labor Costs

Fast, accurate workers selected by simple system. Result is doubling of production on existing lines for packing asparagus spears

IVAN C. MILLER
Editorial Consultant, "Food Industries"

Greater man-hour production of hand-packed whole asparagus spears was a must at P. J. Ritter Co., Bridgeton, N. J. With a very short season in which to pick and pack, and with a big demand for the spears, the logical way to obtain maximum profit was to process more of the vegetables at the right time.

To do this was not easy. While the plant is working on cut spears, a portion of the incoming asparagus matures enough in size, shape and color to be favorable for whole-spear packing. At first, a few employees handle the small volume. But as the volume fed to the hand-pack lines increases, more workers are added until there may be as many as 40 on each line at the peak of the pack.

Old Method Inadequate

To provide for still more packers would have required extending the hand-packing lines. Such a move was out. It would have meant major building, engineering and also equipment changes at an unjustifiable expense.

So Ritter decided to use a dexterity test to select faster workers who would step up production.

Employees on the hand-pack lines work on an incentive plan. And they formerly were selected for this job by a general formula something like this: "She's young, slight and fast. Her merit rating is OK. She should make a good packer. Try her out."

Actually, it would be better to draw names from a hat than to base the selection on general physical characteristics. Dexterity tests have proved that there is no physical yardstick with which to measure ability for hand packing—nor, in fact, for many other processing operations.

Test Results Revealing

Intelligently devised, the tests will reveal a variety of qualifications of an individual. They can measure a person's ability to select one or more shapes from a sample of many colors, sizes, and varieties. They can determine one's skill in assembling similar or unlike objects in a specified order, as well as in arranging things by pattern.

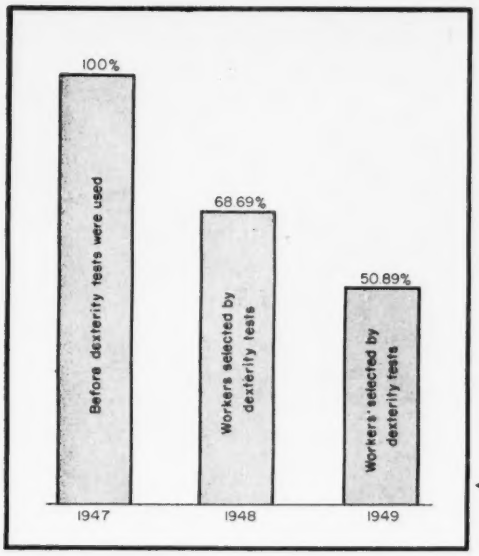
A single simple test is sufficient when only one problem of dexterity is to be solved. A combination test is necessary when the problem is more complicated. One type of test requires the worker to make one or more decisions. It reveals personality characteristics, as well as dexterity. This is particularly helpful in selecting employees for inspection jobs and other work where they must exercise choice of action.

The value of all dexterity tests is that they indicate the relative speed, at a specified level of accuracy, of each worker in the tested group.

How Tests Are Conducted

The dexterity test for hand packing of asparagus at the Ritter plant checked ability to select and skill at assembling in a specified order. The test was planned to appear simple and easy. Production-line operations were simulated as nearly as possible. Carefully worded instructions and a demonstration in slow motion were given by those who conducted the tests. Not only was the objective of the test explained, but the best routine was demonstrated. It was not considered a function of the test in this case to determine the ability of

. . . Results: Man-hours almost halved. Older workers utilized



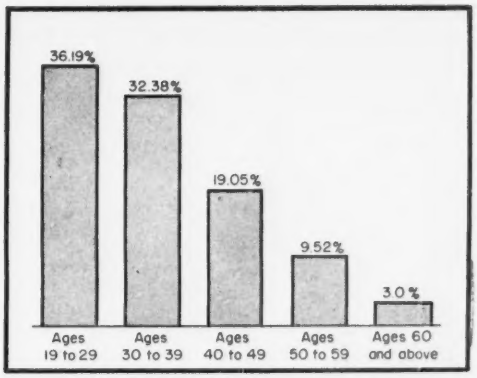


FIG. 1. Many older workers were found efficient by dexterity tests. Chart shows percentage of workers of different ages who hand-packed asparagus spears during the 1949 season.

FIG. 2. Dexterous workers take only half as long to do job. Chart shows man-hours required to hand-pack unit of asparagus spears in glass, expressed as percentage of 1947 rate.

the individual to originate a procedure while taking the test.

After the objective and best procedure were explained, each person tested was permitted a practice run. Helpful suggestions then were made to the individual. This preliminary procedure was calculated to reduce nervousness and produce results which would provide a true measure of the accuracy and speed of each employee.

Observers timed each worker with a stopwatch. Errors were indicated, counted with the employee and then recorded. Each one taking the test was allowed to see the time and error part of her score.

An observer also made notes for the record card of each person tested, jotting down comments on finger, wrist and arm movements, use of one or both hands, loss of efficiency by shifting objects from one hand to the other, and how well standard instructions were understood and followed. If the individual was nervous during the test, that was indicated on the record card. The amount of conversation during and after the test also was noted.

More than 300 women are employed in Ritter's production department, and every one was required to take the test. However, it was made clear that no one would be forced to change to another job as a result of the test. And each woman was assured that she would be given an opportunity to work on the hand-pack lines—with added incentive earning potential—if the test indicated her to be among those best qualified.

Testing revealed two important facts: (1) The results for any individual were unpredictable; (2) when employees were assigned tasks according to results of the test, the accuracy of the test was verified.

Surprising Results

Here is an interesting example of the unexpected: A short woman, who weighed well over 200 lb. and seemed slow in movement, had been assigned to routine tasks. These required little skill, no natural aptitude, and paid the day labor rate. The woman's merit rating was not high, so it came as a surprise when she scored among the best in the dexterity test. This misjudged lady was happy to transfer to one of the hand-pack lines, and the management was pleased to find another fast worker for those lines.

The incentive payment for hand-packing is in direct proportion to the increase in production above an established norm. This woman's record shows that she not only was among the fastest and most accurate women on the lines, but that her incentive pay often was more than her hourly rate earnings. Her total earnings frequently more than doubled her former wages. Her merit rating, of course, has been raised.

Another example indicates the accuracy of the dexterity test. One woman filled the first four cans in near record time. She completed the test with no errors. But she slowed down on the last two cans. Her nervousness was apparent. So she was assigned to the middle of the hand-pack conveyor line where the tempo is slower than at the head of the line. Here her incentive pay was better than average.

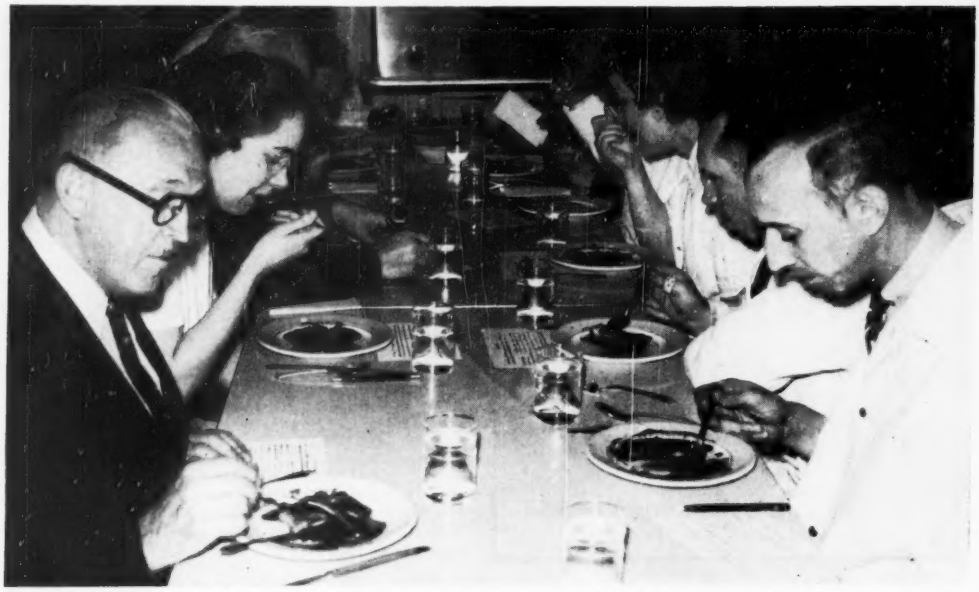
The first stations on the line are coveted positions, because the proportion of suitable sizes is greatest when the spears are first delivered to the line. These choice locations are rotated among those who prove they can keep the pace. The woman who had been assigned to the middle of the line, and who had made good, asked for a chance at the number one station. When she was transferred to this station, her incentive pay dropped. Her instinctive attempt for complete accuracy, coupled with her nervous tendency, reduced her production when competing at the faster tempo. She willingly went back to the middle of the line.

Older Workers Efficient

Dexterity tests have completely changed the type of employee on the hand-pack lines at Ritter's. Formerly, nearly all workers on these lines were between 19 and 30 years of age. Today more than 60 percent of the hand packers are past 30, a few past 60 (Fig. 1). Many in the 50-to-70-year group make sizable amounts on incentive. In the past, size and build were considered important in selecting hand packers. Those who seemed lithe, agile and

(*Turn to page* 192)

Good Wrapper Protection? Taste Will Tell!



DOES THE NEW PACKAGE guard the freshness and quality of the product? And is there full freedom from "wrapping flavors"? These specific questions—only two of many to be resolved—are checked by the taste panel.

Put Your Packaging On A Solid Footing

Top-to-bottom coordination—best effected by crack interdepartmental committee—is first in the formula. The rest is hard work, punctuated by constant evaluations

C. K. WIESMAN
Director of Development,
Armour & Company, Chicago

In organizing for greater efficieney in packaging, initial consideration should be given to the various tools necessary "to make the machinery function smoothly and efficiently."

Ideas must be properly channeled and results of experiments must be carefully evaluated. Decisions must be made and various departments must be alerted so that the wheels of production may be set into motion.

In industry, research means nothing unless there is a worthwhile return. This return is not attained merely by setting up a laboratory and filling it with scientists. There must be proper coordination between the laboratory and other departments. All projects must be properly evaluated before investigations are begun. Results of research must be carefully appraised during the investigation and again upon its completion. And, finally, there must be a means of putting the research results to use.

A most effective way to accomplish these objectives is through a specially organized packaging committee consisting of representatives from key departments. This group should be made up of executives who can make official decisions and carry an idea from conception to actual production. Chart I outlines organization of such a packaging committee.

Duties of Committee Chairman

It is suggested the committee chairman be chosen from the sales or operating departments. In a large organization, this chairman's duties might take up all his time. His tasks are to: (1) Lead discussion on ideas pertaining to products and packaging, (2) gather and disseminate vital information on all products and package projects being investigated, (3) set up and channel problems to the packaging laboratory, (4) keep in contact with interested departments, and (5) expedite the progress of developments and follow through during the various stages of the investigation.

The committee secretary should be more than a reporter and a typist. He should be thoroughly familiar with all problems before the committee and he should be able to substitute for the chairman when necessary.

The research department especially should be represented on the packaging committee, because many of the ideas require product development before actual packaging research begins. The packaging laboratory naturally should be represented to report on progress of investigations and to receive suggestions on problems under study.

Role of Various Departments

A committee member from the sales department serves for all sales divisions. He brings sales ideas and problems to the committee. Sales research consists of market and consumer tests on all new products and pack-

Departmental team . . .

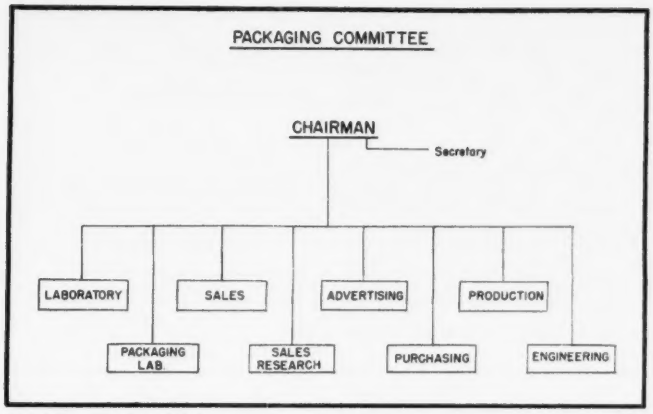


CHART I—PACKAGING COMMITTEE consists of representatives from key departments, with full-time chairman from sales or operating departments.

. . . and the job it tackles

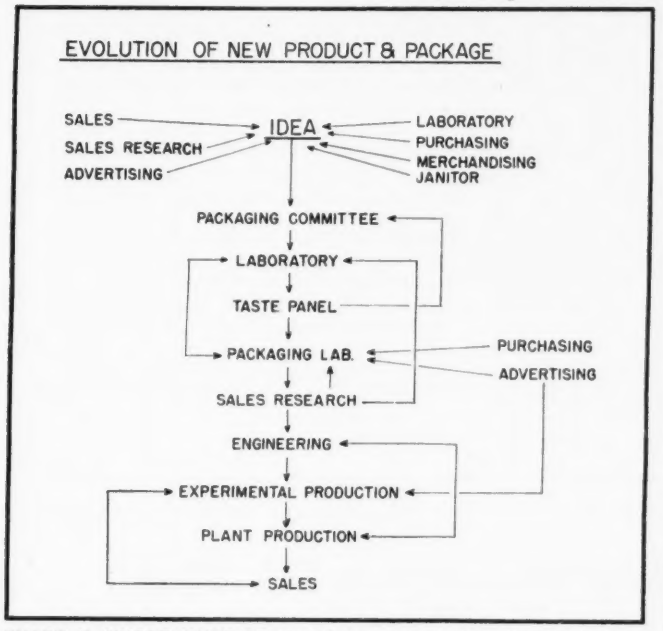


CHART II—THERE MUST BE careful development through several stages before original idea is shaped into finished, packaged product.

ages. These tests are reported to the committee.

The advertising department is interested in package style and design, while the purchasing department contacts suppliers of packaging materials, furnishes samples to the packaging laboratory, and collects cost data.

Responsibility for plant operations and authorization of experimental runs is up to the production department. Functions of the engineering department are to lay out production lines, secure proper equipment, and design new equipment when necessary.

Thus, all of the necessary departments are represented in the packaging committee to permit evolution of a new product or package—from idea to reality.

Chart II depicts the various stages frequently necessary for the development of a new product or package. The idea—which may emanate anywhere in the company—is brought to the attention of the committee. If, after careful consideration, it merits investigation, a project is outlined and submitted to the laboratory.

Step-By-Step Approach

Let us assume that the company wants to package frozen, precooked meat balls. Since this is a new product, it is necessary to develop an acceptable meat ball. So the laboratory formulates a meat ball which goes to a taste panel for evaluation. This panel, after due consideration, passes on the product. Next, it is submitted to the packaging laboratory, where a consumer package is developed to meet the essential requirements.

Let us now digress for a moment to consider why a new package may be necessary. One or more of the following reasons may be cited: (1) To protect a new product, (2) to improve the present package, (3) to increase sales, (4) to meet competition, (5) to lend itself to changes in retailing methods (self-service of meats, for example), and (6) to take advantage of new packaging developments.

Our hypothetical case—the packaging of frozen, precooked meat balls—falls into the first-named category. Initial step for the packaging laboratory is to find out what the package must do for the product. Requirements must be determined and a package developed to meet them.

Factors that must be considered in this development of the package are: (1) Nature of the product, (2) filling temperature, (3) storage temperature, (4) expected shelf-life of the product, (5) amount of protection necessary for the product, (6) adaptability of the package to mechanization, (7) appearance and consumer appeal, and (8) package costs.

Keeping all of these points in mind, assume that a package is finally created by the laboratory and submitted to the sales research department, where consumer acceptance tests are conducted. At the conclusion of these tests, the package may be returned to the laboratory for further research, and then may again go back to the packaging laboratory (as shown by arrows in Chart II). Or, it may go from sales research directly back to the packaging laboratory for modification or change.

Samples of the accepted package are submitted to the advertising department for design work, so that a finished package is ready when experimental production of the meat balls is begun.

Now that a satisfactory package has

(*Continued on page* 182)

CORN TRUCK STUDY

DATE 8/27/49 PLANT Q GROWER R. A. Bochne TRUCK NO. 32 DRIVER J M Vardaman

NO.	ARRIVE FIELD	START LOAD	END LOAD	LEAVE FIELD	ARRIVE PLANT	START DUMP	LEAVE PLANT	WT. LOAD	REASONS FOR DELAY
1	6 45	6 47	7 32	7 35	8 01	9 38	10 02	9830	Wait at dumper (8 trucks ahead)
2	10 26	11 14	11 50	11 54	12 31	2 56	3 22	10200	In field - wait for free loader - at plant, wait for dumper (14 trucks ahead)
				Truck for day					

FIG. 1. Time-study chart for cannery trucks proved dumping procedure to be wrong.

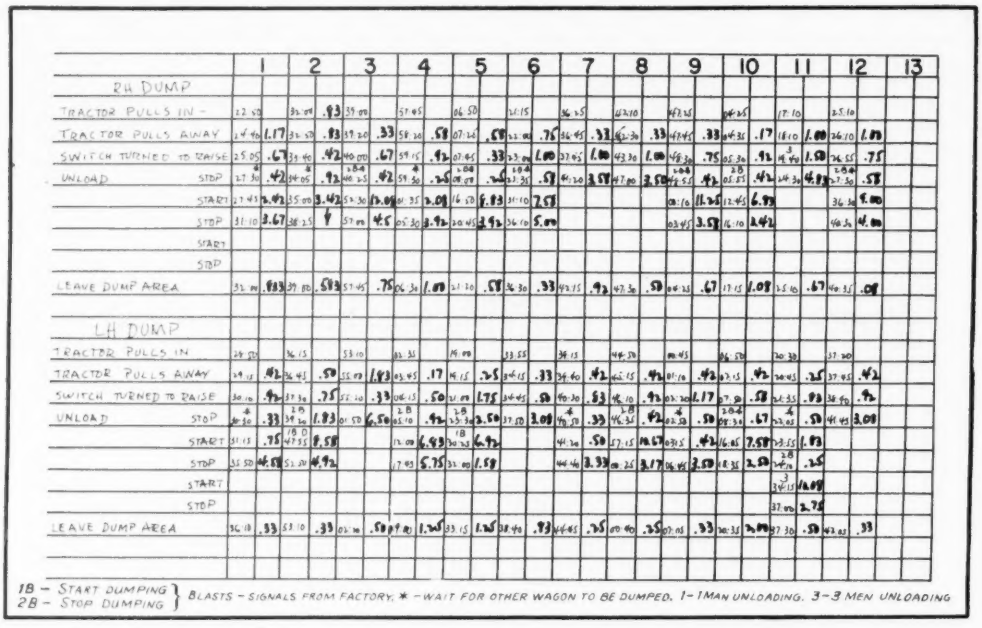


FIG. 2. Form used in time study of cannery dumping crews. Study proved that number of men in crews was adequate.

Time Studies Help Processors Six Ways

They improve schedules, analyze job requirements, check worker efficiency, distribute work uniformly, establish pay rates, determine best methods

GERALD NADLER

Instructor in Industrial Engineering, Purdue University, Lafayette, Ind.

Motion study in the canning industry has resulted in better methods for performing many tasks[1]—and the procedure should be used more freely in all food processing plants.

Many plant executives, however, feel that time study is not needed. They argue that many of the operations are machine controlled, and that the machinery has a maximum load limit which controls flow of product through the plant. Since these conditions exist, it is then contended that most other human activity need not be standardized as far as the factor of time is concerned.

There are, nevertheless, many uses of time study in a food plant. This is true even though no determination of a standard pace is made, and although the key jobs in a plant may be controlled by machines.

Here are some of the advantages of

an elementary form of time study[2] in a canning plant:

1—Improving Schedules

Line study facilitates the checking of schedules and determines the reasons for nonconformance to schedules. Frequently the schedules for trucks, mechanical equipment in the field, and men in the plant do not operate effectively.

For example, sweet corn was brought to a plant in trucks, then dumped and loaded onto wagons. A schedule supposedly arranged truck arrival times so that the loads could be dumped almost immediately after being weighed. However, there was a jam-up of about 20 trucks at the plant every morning.

This jam disrupted the schedules of field crews and trucks.

At first, it was felt that the schedules were not correct. So an elementary time study was made to determine actual conditions. A form (similar to Fig. 1) was prepared for each truck, and time values were recorded on three different days.

Each driver recorded such data as time of arrival at field, start-loading time, finished-loading time, leave-field time, and the reasons for any waiting time. From these facts, it was found that the schedules were not wrong. Instead, the dumping procedure was making the schedules ineffective. As a result, more trucks were required to keep the plant supplied, and crews in the field wasted time.

To improve the dumping method, another elementary time study was made. (At this point a further step was taken which is still in process. For some time it had been felt that a better way of handling the corn was needed, and work simplification[1] experiments were started.)

2—Determining Job Requirements

Time study aids in checking the number of men or machines required for jobs. A case in point is a study of the work of the crews dumping corn from wagons onto a conveyor going into the plant. The purpose was to determine if more men were required. A form (Fig. 2) was used to record time values measured with a stopwatch. The study showed that there were enough men on the job, because they were able to keep the plant sufficiently supplied with corn, and also had time for rest.

Another example involves a study of the number of machines and men required to cut, load and transport pea vines from the field to the viner station. Elementary time studies were made on several fields servicing several viner stations. Forms (Fig. 3) were used in timing the cutters, loaders and each truck, as well as to record the number of men used to load the trucks. The time values, as well as the weight values, indicated that fewer men were needed on loading. Results of a study of this type can be summarized (see Table next page).

3—Checking Worker Efficiency

Workers' efficiency on similar jobs, or on partially machine-controlled jobs, can be checked. In a corn canning operation, women placed unhusked ears in a slot conveyor which carried them through husking machines. The conveyor moved at such a rate that 80 slots per min. passed the operator. The performance of each woman was easily determined by measuring the time required for her to place 80 ears of corn on the conveyor. Performance also could have been checked by counting the number of ears each woman placed on the conveyor per minute. Either method, when repeated a few times, gives the average production of each worker, which is easily converted to efficiency.

4—Distributing Work Uniformly

The work of a crew can be checked to find if the task is distributed evenly among the members. Such a check may be needed when an em-

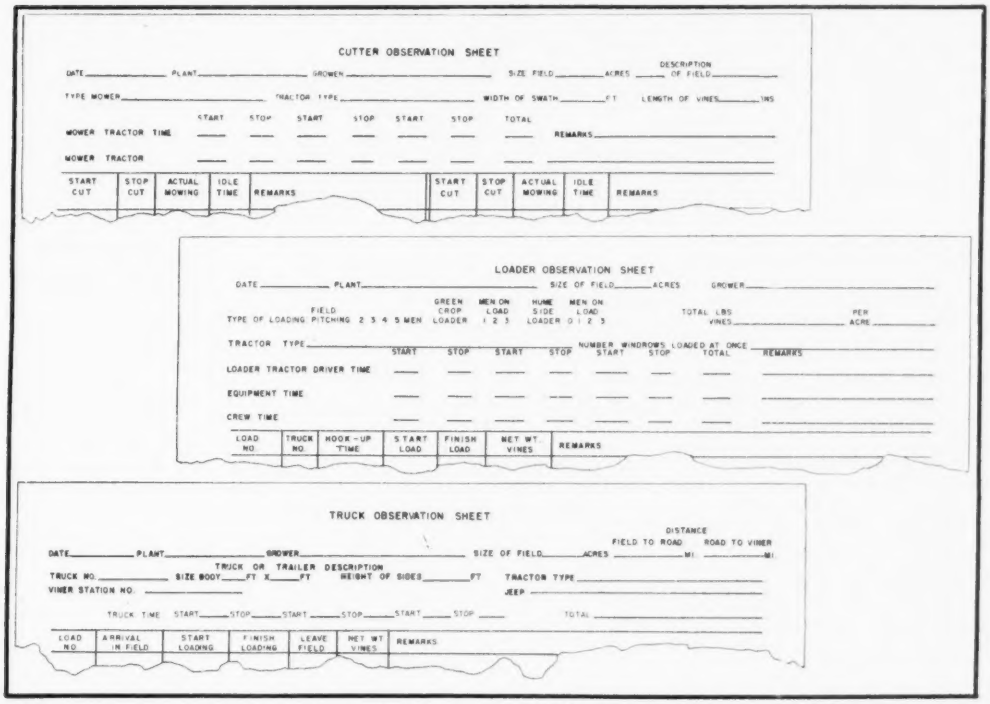

CUTTER OBSERVATION SHEET
DATE PLANT GROWER SIZE FIELD ACRES DESCRIPTION OF FIELD
TYPE MOWER TRACTOR TYPE WIDTH OF SWATH FT LENGTH OF VINES INS
START STOP START STOP START STOP TOTAL
MOWER TRACTOR TIME REMARKS
MOWER TRACTOR
START CUT STOP CUT ACTUAL MOWING IDLE TIME REMARKS START CUT STOP CUT ACTUAL MOWING IDLE TIME REMARKS
LOADER OBSERVATION SHEET
DATE PLANT SIZE OF FIELD ACRES GROWER
TYPE OF LOADING FIELD PITCHING 2 3 4 5 MEN GREEN CROP LOADER MEN ON LOAD 1 2 3 HUME SIDE LOADER MEN ON LOAD 0 1 2 3 TOTAL LBS VINES PER ACRE
TRACTOR TYPE NUMBER WINDROWS LOADED AT ONCE
START STOP START STOP START STOP TOTAL REMARKS
LOADER TRACTOR DRIVER TIME
EQUIPMENT TIME
CREW TIME
LOAD NO. TRUCK NO. HOOK-UP TIME START LOAD FINISH LOAD NET WT. VINES REMARKS
TRUCK OBSERVATION SHEET
DISTANCE FIELD TO ROAD ROAD TO VINER
DATE PLANT GROWER SIZE OF FIELD ACRES MI MI
TRUCK NO. TRUCK OR TRAILER DESCRIPTION SIZE BODY FT X FT HEIGHT OF SIDES FT TRACTOR TYPE
VINER STATION NO. JEEP
TRUCK TIME START STOP START STOP START STOP TOTAL
LOAD NO. ARRIVAL IN FIELD START LOADING FINISH LOADING LEAVE FIELD NET WT VINES REMARKS

FIG. 3. Series of forms employed in time study of pea cutting, loading and trucking. It was found that fewer men were needed on loading operation (see Table on following page).

TABLE—SUMMARY of Time-study Data for Pea Cutting, Loading and Trucking (see Fig. 3).

	Cutter		Loaders (1 man on load)	
	Reaper	Mower	Loader 1	Loader 2
Start time	6:30 a. m.	6:30 a. m.	6:40 a. m.	7:00 a. m.
Stop time	1:55 p. m.	2:22 p. m.	2:25 p. m.	2:25 p. m.
Total operating time, hr.	6.92	7.37	7.25	6.92
Actual operating time, hr.	2.30	2.47	2.75	3.57
Repair time, hr.	2.00	0.28	2.33	0.57
Nonoperating time, hr.	2.62	4.62	2.17	2.78
Moving time	0.00	0.00	0.00	0.00

Total acres cut	7
Total lb. vines cut	132,270
Acres per total hr. (2 mach.)	.490
Acres per actual hr. (2 mach.)	1.469
Lb. vines per acre	18,896
Lb. vines per cutting hr.	27,749

Lb. vines loaded	63,310	68,960
Acres loaded	3.35	3.65
Acres loaded per total hr.	0.462	0.528
Acres loaded per actual hr.	1.218	1.023
Lb. vines loaded per total hr.	8,732	9,970
Lb. vines loaded per actual hr.	23,021	19,334
No. of truck loads	15	15
Ave. loading time per truck, hr.	0.183	0.238
Ave. weight per load, lb.	4,221	4,597

	Truck Number		
	8	9	32
Average times: (min.)			
From viner to field	4.44	4.67	3.67
Waiting at field	11.5	8.4	8.1
Loading	13.1	15.5	14.7
From field to viner	3.7	4.7	4.5
At viner station	13.7	9.9	11.6
Total vines, lb.	42,350	43,880	46,040
Number of loads	10	10	10
Average load, lb.	4,235	4,388	4,604
Loading rate for truck lb. vines per hr.	19,397	16,986	18,792

Distance from field to road, 0.25 miles; distance from road to viner station, 0.50 miles.

* Tarpp Farm, Viner Station 3, two vining units (July 9, 1948).

ployee complains that he is working too hard, or that a fellow worker is not working hard enough.

A study was made to determine the amount of time worked by a man who raised and lowered wagons in comparison with the two men who raked off the corn. The two rakers worked longer at a more difficult task. Allowing the workers to rotate jobs periodically equalizes such work.

5—Establishing Incentives

Time study is important in determining the basis upon which incentive wages are to be paid. Often as not, incentive rates are based on past performance. Therefore, something may—and usually does—go wrong. The fault frequently can be traced to variables in the product. Variables do change from year to year, and many discrepancies in the incentive system do arise. With elementary time study, a comparison between past and present performance usually can be made to determine the adjustments needed.

The husker women, mentioned previously, were on a group bonus based on the tonnage of corn put through the husking machines. The tonnage standard was based on the average weight per ear of corn and the number of ears machined. Elementary time study revealed that the women were handling more than the average number of ears required, yet they were not getting a bonus. Examination of the corn showed that the average weight of the ears was below the standard. So the incentive rate was corrected.

6—Determining Best Methods

Workers on the same job often will employ different methods. To determine which method is the better, results can be prepared by elementary time study.

Sixteen women were employed on a corn cutter operation. They used three methods in taking the corn from a chute to a chain conveyor which carried it through the cutter. These methods involved: (1) an asymmetrical hand pattern, where one hand flipped an ear of corn into the other hand which placed the ear on the conveyor; (2) an alternate hand pattern, where each hand placed an ear on the conveyor out of phase with each other; and (3) a simultaneous hand pattern, where the hands each picked up an ear of corn and placed the two ears on the conveyor at the same time.

Some of the women complained of tiredness, while other women were not averaging as many ears as they should. An elementary time study showed that much of the tiredness could be avoided—and that average production could be raised—by using either the simultaneous or alternate hand pattern rather than the asymmetrical.

References

1. G. Nadler, "Industrial Engineering Cuts Labor, Time, Handling." FOOD INDUSTRIES, 21:585-87, 1949; also "Simplify Your Plant Tasks the Symbol Way." FOOD INDUSTRIES, 21:875-77, 1949.
2. M. E. Mundel, *Systematic Motion and Time Study*, Chapter 10, Prentice Hall, New York, 1947.

MSG Settles Down

Production at present levels fills industrial demand leaving direct consumer market as great potential

TOTAL domestic production of monosodium glutamate in 1948 was 6,200,000 lb. Made by four companies, nearly all of it was sold at an average rate of $1.55 per lb. The Huron Milling Co., Harbor Beach, Mich., produces about 2,500,000 lb. yearly. The International Minerals & Chemicals Co., Rossford, Ohio, and San Jose, Calif., turns out almost 3,500,000 lb. pear year. General Mills, Inc., Keobuk, Iowa, makes about 1,000,000 lb., mainly for its own use in dehydrated soups. And from A. E. Staley, Decatur, Ill., comes about 1,000,000 lb.

The California plant of International Minerals uses Steffens waste from beet sugar production as a raw material. Staley uses corn gluten. The other plants start with wheat gluten. Staley has planned to use soy protein as a raw material, but reportedly has not done so successfully.

While wheat gluten seems to be the best raw material, wheat starch is a byproduct, and the market for this starch is now limited. For this reason, other raw materials are being sought where the byproducts can be easily sold.

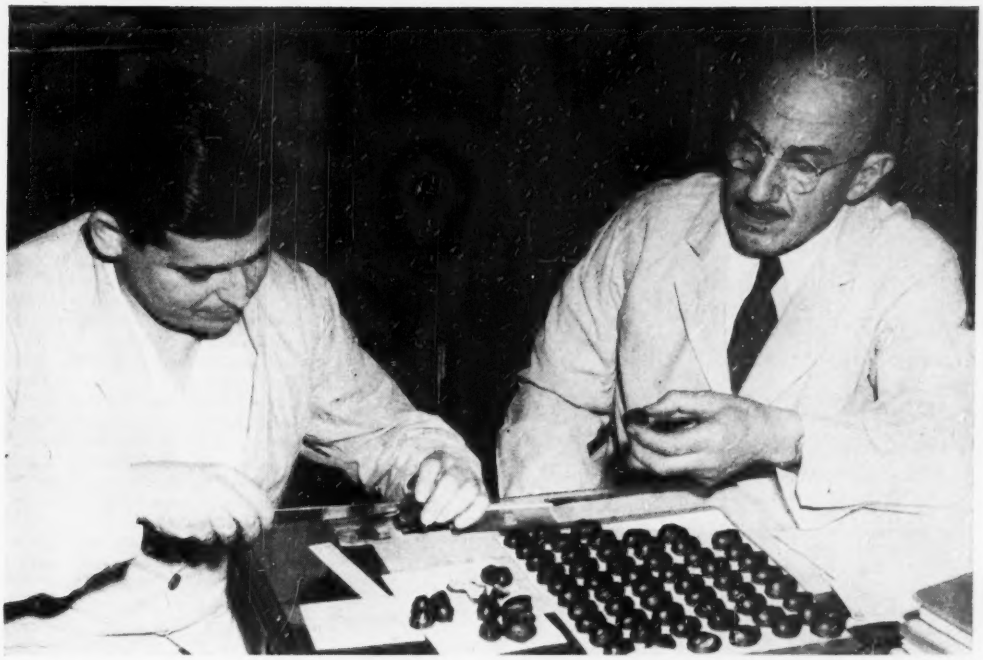
The total capacity of established plants is about 12,500,000 lb., which appears sufficient at present.

About 2,000,000 lb. goes to canned soup, the same amount to canned meat products, about 1,000,000 lb. to dry soup mixes, and approximately another 1,000,000 lb. to restaurants. A smaller amount is sold directly to the consumer for table use.

The industrial markets are probably not far from saturation at today's levels of business activity. The retail market has a great potential. The Japanese sold 9,000,000 lb. yearly to a population of about 70,000,000.

An effective aid to increased use is a recent decision of the Federal Food & Drug Administration that MSG is not an artificial flavoring, and does not have to be labeled as such.

MSG production can be expected to expand greatly, both here and in foreign countries, once the product is widely accepted for home use. High price is an important deterrent. An eventual bulk price of $1 a pound has often been suggested. The ability of manufacturers to meet this price depends on raw material problems as well as consumer acceptance of MSG.



CAREFUL CHECKS not only make sure that they're good now, but also that they'll be good later. Here, candy kitchen staff is seen checking chocolates after tests simulating handling in stores and homes.

9-Point Plan Assures A-1 Quality

Tightening every control, Loft banded 5 special inspections with 4 proven sanitary measures—and they quickly added up to better-than-ever candy

JOHN V. ZIEMBA
Assistant Editor, "Food Industries"

Chief goal in the manufacture of candy is quality. For if a candy is to win popularity and gain repeated sales, it must definitely satisfy the consumer.

During the past 90 years, Loft Candy Corp., Long Island City, N. Y., has been producing quality confections. And now today, it is getting even higher quality through the establishment of a new, rigid and efficient control system that calls for these 9 steps:

1 Triple-inspection of all raw materials, by purchasing department and control laboratory.

2 Fumigation of incoming ingredients of the type that support the growth of insects, also of all incoming packaging materials. Treatment, too, of all stock boxes after use.

3 Opening of boxes and barrels of ingredients in the basement, instead of processing departments, thus preventing the chances of nails and wooden splinters getting into confections.

4 Keeping all perishables—raw material and even centers—under refrigeration.

5 Making weekly sanitary inspections of the plant.

6 Conducting routine inspections and shelf-life tests of finished goods in the candy kitchen.

7 Detailing roaming inspectors to check on candies being processed, and also to inspect plant and equipment.

8 Double-checks by top management on the quality of candies—by the vice president in charge of manufacturing and by the director of formulas and quality control.

9 Sanitary practices to eliminate possible sources of rodent and insect infestation in the plant.

As for the first quality-control measure—triple inspection of incoming raw materials—samples of such items as nuts, sugar, flour, chocolate coating, dried and preserved fruits are initially examined for evidence of insect and rodent infestation, mold growth, rancidity and adherence to specifications (weight, count, size, color and texture).

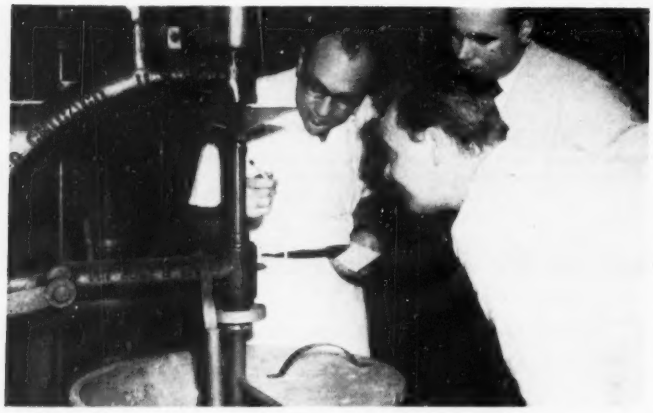
While these sample examinations are time-consuming, they do save the supplier and candy company money. No longer is the supplier faced with a trucking expense. For if his product is rejected, he is advised of the results of the analysis before making a shipment. On the other hand, Loft is spared the cost of unloading, fumigating, storing and then reloading entire lots for return when not found suitable.

First inspection of raw materials is made by the purchasing agent, who is experienced in food inspection. Before buying, he examines samples.

Second and third inspections are

Constantly Watched: Materials, Machines, Manufacture

CONTROL LABORATORY checks all incoming raw materials for evidence of infestation as well as adherence to specifications.



INSPECTOR points to defective grease-catch guard on cooking kettle agitator shaft during weekly inspection, as plant engineer and superintendent watch.

THESE roaming inspectors collect samples for double-check by vice-president and by director of quality control. Samples are taken before and after coating.

undertaken by chemists. These men are experts, formerly with the New York City Department of Health, where they acquired broad experience with many food products in all stages of purity and contamination.

As Murry Raphael, director of sanitation control puts it, "The quality of candy is only as good as the ingredients used." That is the reason for the triple-checking of incoming supplies—even packaging materials.

The second inspection is also on samples, taken from initial small lots, say ten 55-lb. cases of nuts or ten 100-lb. bags of sugar. These samples are submitted to the laboratory and, if they are acceptable, then the entire lot is ordered.

When lots arrive at the plant, they remain on the receiving platform until the control laboratory makes the third inspection. If, at this time, there is any question about acceptance, then the matter is brought to the attention of the chief chemist, who makes the final decision. This procedure aims to cut down complaints from suppliers who might feel that the company has been hasty.

Working With Suppliers

Loft makes a particular point of cooperating with suppliers. For example, whenever a supplier registers a complaint, the company invites him to the laboratory to look over the sample responsible for the rejection. And if a supplier is cooperative, the company will, if desired, send a technician to inspect his plant and raw materials in order to show him his difficulties.

In one case, a manufacturer protested when his product was declared to contain foreign metal and was therefore rejected. He visited the laboratory, examined the product under a microscope, and saw the metal fragments in it. Then, he and his chemist made investigations that checked with Loft's results.

Another supplier protested the rejection of a shipment of preserved fruit analyzed as containing foreign matter, claiming that contamination was impossible. But when he saw the evidence under the microscope, he immediately hired a chemist of his own to test shipments leaving his plant.

Supplies Fumigated

Guarding against the introduction of insects into the plant by fumigating incoming material such as flour, nuts, dried fruit, cartons and even stock boxes was the second control measure adopted. Following arrival on the receiving platform, these materials are loaded into three vault-type chambers and fumigated with methyl bromide gas. Each vault holds about 6,000 lb.

of product. Two of the vaults are charged two times a day, one three times. Then, and only then, is the fumigated material permitted into the plant.

Now to the third and fourth quality control measures: One is to employ skilled coopers to open boxes and barrels of ingredients in the basement. Thus, flying wood splinters and nails are confined to an area well apart from processing operations.

The other step is to hold perishables in refrigerated rooms—even candy centers—where temperatures are kept below 45 deg. F.

Weekly Inspections

Safeguarding quality through weekly inspections by a member of the laboratory together with plant engineer and building superintendent, is the fifth control measure. In the course of these inspections, the chemist directly suggests corrective measures should any unsanitary conditions be found in the plant. Instead of reading reports citing unsatisfactory conditions, department heads responsible for the equipment and maintenance are actually shown what needs correction. As a result, these department heads are in a better position to correct them.

A written report follows the inspections. And finally, a roaming inspector checks to see if the conditions cited have been corrected.

Specifications on the way raw materials are received must be rigidly adhered to. Preserves, for example, must be shipped in metal containers with tight covers, easily replaced—instead of in wooden barrels which, once opened, are difficult to re-close and are therefore a source of contamination.

Chocolate coatings are no longer received in jute bags. They now come in non-returnable cardboard cartons or multi-wall paper bags. Cloth bags are banned because they are a source of insect contamination, and storage of empty bags in the plant can bring on a rodent-harborage problem.

Candy Kitchen Control

Sixth control measure takes place in the candy kitchen, which is under the direction of Peter C. Laureys, the director of formulas and quality control. He has had nearly half a century of practical candy-making experience. The kitchen plays a key role in maintaining quality, through the following four steps:

First, samples of creams, selected by a roaming inspector, are submitted for tests. These check-ups consist of an appraisal of the texture, flavor and general appearance of the creams.

Second, the merchandising department furnishes samples of competitive products, which are analyzed and compared with those manufactured by the company.

Third, complaints and suggestions from the sales people are investigated. Also suggestions are encouraged from consumers. The company maintains that, by a free exchange of information, efforts can be made to improve continually upon the candies, making them more and more popular.

Fourth, every day boxes of candy from each production line are submitted to the kitchen. These candies are subjected to shelf-life tests under conditions simulating handling in stores and homes. After two to three weeks, boxes are opened and the candies are examined for evidence of staleness, chocolate bloom, fermentation, and rancidity.

The candy kitchen is a miniature plant, equipped with cooking kettles, ball beaters, cooling slabs, dipping tables, and forming machines. Here, too, are kept the formulas.

Aside from controlling quality, another important function of the kitchen is the development of new candies. When, for example, a request is made for a rum and butter toffee, the kitchen proceeds to make a formula. Next, a small batch of the candy is made, using miniature equipment similar to that employed in the plant. Then, samples are submitted for approval by the merchandising department.

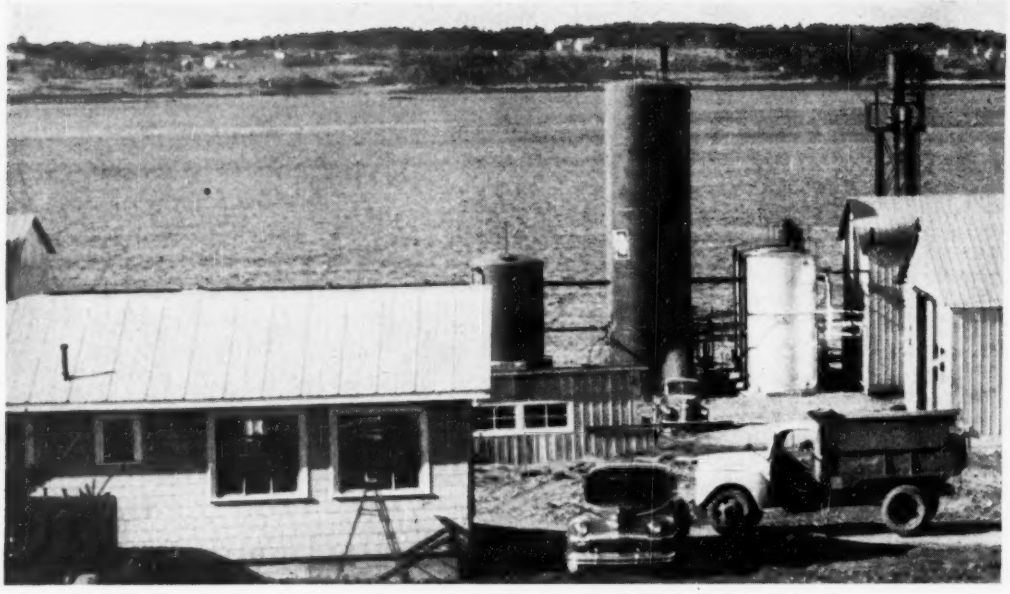
If the candy receives an okay, initial production-size batches are manufactured in the plant. Finally, with

(*Turn to page* 182)

Barred: Infestation, Foreign Fragments

BEFORE entering plant, all incoming ingredients and packaging supplies are fumigated with methyl bromide gas to prevent insect infestation.

BARRELS containing ingredients are opened in basement—well away from processing so that nails and wooden splinters cannot get into confections.



DOLLARS FROM WASTE. Into this modern byproducts-reduction plant—instead of into the harbor (rear)—goes sardine-

There's Good Hard Cash in Stickwater

Instead of dumping it in the harbor, Maine fish company now condenses it into a rich animal-feed byproduct—and turns a neat profit

FI STAFF

With the recent installation of special equipment that continuously condenses fish-waste stickwater, Associated Fish Products Co., Eastport, Me., is turning a former waste into a cash profit.

Handling 15 tons of fish waste an hour, these units now recover—in addition to fish oil and meal—2,250 to 2,625 lb. of condensed fish solubles. For these, the company receives a price varying from 5¢ to 8¢ per lb., which nets it $112.50 to $210 on the 15 tons of waste.

This plant is the first on the east coast to concentrate its stickwater into these solubles for enriching poultry and livestock feeds.

Additional Bonus

In addition to the condensed solubles, this method—the Sharples-Lassen process—recovers high-protein meal (30 times more riboflavin than ordinary meal) and also oil. Specifically, from every ton of fish waste processed, an extra 10 lb. of fish meal and 2 gal. of oil are now obtained by the system.

This new waste-recovery field was opened by Sven Lassen, director of Van Camp Laboratories, Division of Van Camp Sea Food Co., Terminal Island, Calif. He discovered that stickwater was a rich source of proteins, vitamins, minerals and the "animal-growth factor" (vitamin B_{12}) for supplementing animal feeds. His investigations had a two-fold purpose: (1) To eliminate the nuisance created by discharging stickwater into harbors, resulting in unsanitary obnoxious-odor conditions, and (2) to develop an economical process for recovering valuable proteins and vitamins from this waste.

After the first recovery process was put into operation, engineers of Sharples Corp., Philadelphia, made considerable improvements in many of the unit operations—particularly in removing oil and suspended solids from stickwater by centrifuging. With both of these materials removed, the solubles are free from objectionable odors and they will not decompose during processing or storage.

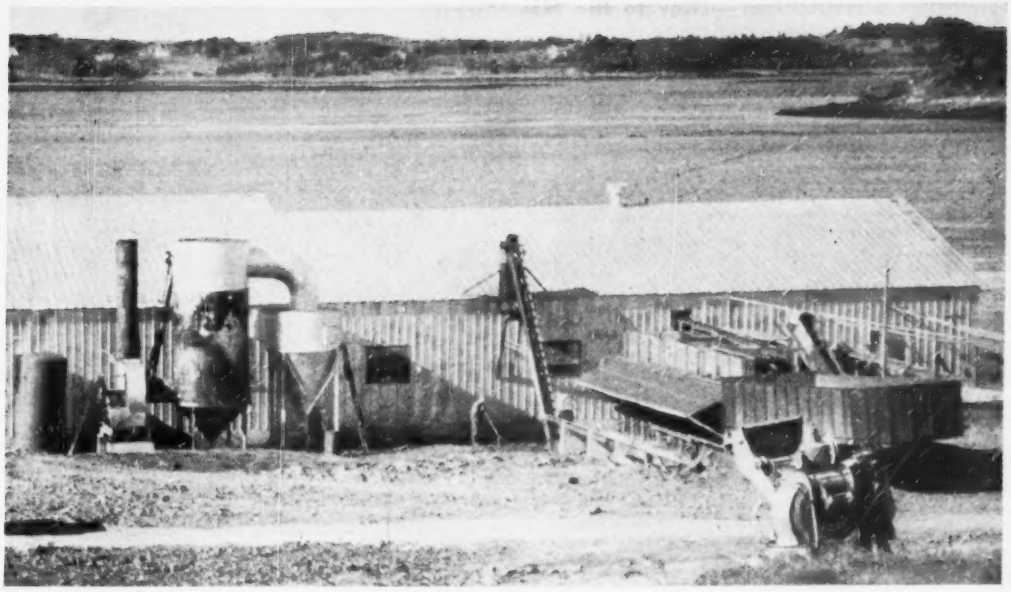
Stickwater is condensed from 5 to a 50 percent solids, the optimum concentration. This cuts down cost of shipping by getting rid of excess water. It also facilitates pumping into tank cars and processing lines.

Valuable Animal-Feed Adjunct

One of the largest outlets for the solubles is in poultry feeds. Because it contains the animal growth factor, the addition of 3 percent of solubles to ordinary chicken feed is reported to produce as much as a 50 percent increase in poultry growth.

Another increasingly large outlet is for cattle feed. Blending the solubles with other material for cattle feed will also result in a significant increase in animal growth.

Associated Fish Products Co. had not, as a matter of fact, encountered any problem in discharging its stickwater into the tidewaters, because the 25-ft. rise and fall in tide diluted the waste sufficiently. Instead, the need for a new system—as foreseen by President Moses B. Pike—hinged on the question of economy. He had



waste stickwater. And out comes condensed fish solubles, newly important in enriching poultry and animal feeds.

recognized the current difficulties that beset the fish byproducts recovery business—

1. The fish-oil business has suffered a set-back. Soap manufacturers are using less oil to make soap—are processing more synthetic detergents. This situation has brought about a sharp drop in the price of fish oil—from about 22¢ to 5¢ a lb.

2. Present prices of fish meal are unsteady, and now definite drops are predicted because of: (a) increased catches of fish on the West Coast, (b) decline in shipments under the European Recovery Program, (c) a slump in animal-feed buying in this country, and (d) foreign competition—on the rise because fish-meal plants are being constructed in Iceland and South Africa, where costs of labor and raw materials are lower.

The "How" of Recovery

Let us now detail the recovery process:

Fish waste is trucked from the company's ten nearby sardine canneries to the byproducts plant, where it is dumped into an outdoor, 25 ton-capacity, metal-lined wooden hopper. From this point, a 14 in.-dia. horizontal screw-conveyor carries the waste 35 ft. to a drag-conveyor that lifts and feeds it into a 3-bin, raw-storage box (each bin holds 20 tons).

Now, the actual recovery of the byproducts—meal, oil, and condensed fish solubles—begins. Sardine waste is conveyed from the raw box into the reduction plant, where dried fish meal is recovered and where the press liquor is pumped to the stickwater plant for further treatment.

At the bottom of each raw-box bin are three 3 x 3-ft. doors. As the waste is needed, these doors are opened so that it drops onto a 12 in.-dia. horizontal screw-conveyor that takes it 35 ft. to another drag-conveyor. Lifting the waste about 18 ft., this conveyor feeds a 200 lb. capacity reservoir hopper on top of the reduction plant. From this hopper, another horizontal screw-conveyor carries the waste into the plant and delivers it to one of the two continuous cookers.

Waste Gets Light Cook

Cooking prepares the waste for pressing—separation of waste into press meal and liquor. Since the sardines have already been steam-cooked in the canneries, their waste—heads and tails—needs only a light, 20-min. live-steam cook. This is given the waste as a worm-screw carries it from one end of the unit to the other. The rate of this passage is 10 tons per hour per cooker. Steam is fed, at 10 to 15 psi., from a header alongside the cookers and bled to two rows of steam nozzles, spaced a foot apart at the bottom and one side of each cooker.

Cooked waste is next gravity-fed into continuous, horizontal screw presses. The yield of these presses, which operate at reduced pressure, comprises 40 percent press cake and 60 percent press liquor. The cake contains between 55 to 60 percent moisture.

Getting the Meal

Now to the treatment of the cake: From the two presses, cake drops onto 12 in.-dia. horizontal screw-conveyors that converge at a center point. Here, a vertical screw-conveyor elevates the press cake 10 ft., to a point where it is chuted to another 12 in.-dia. screw-conveyor that carries it 20 ft. to a direct-fired continuous dryer.

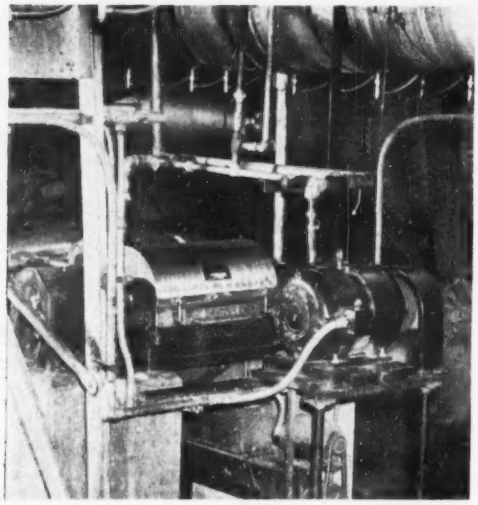
The latter unit has two sections—one for combustion and the other for product-drying. Temperature in the fire brick-lined combustion chamber is about 1,500 deg. F., and heat is furnished by a Bunker C oil flame running the length of this section.

Correct Moisture Content Essential

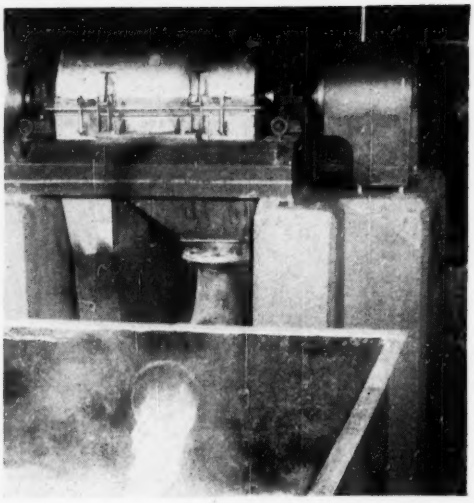
Press cake is fed into the product-drying chamber, where it is dehydrated to an 8 percent-moisture content. The rate is ½ ton of dry meal an hour. A suction fan at the discharge end of the unit pulls the hot air through the drying chamber.

Uniform drying is attained by tumbling and mixing actions. Press cake is tumbled as it travels through the rotary dryer, revolving at 10 rpm. And it is mixed during the drying period by 10-in.-wide horizontal vanes that are spaced a foot apart inside the dryer.

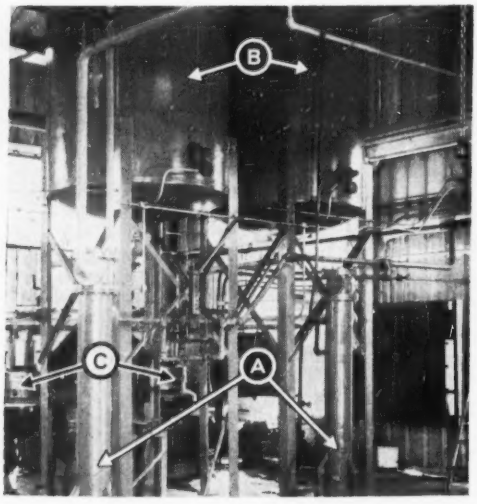
Closeups of Clarification — Key to the New Process



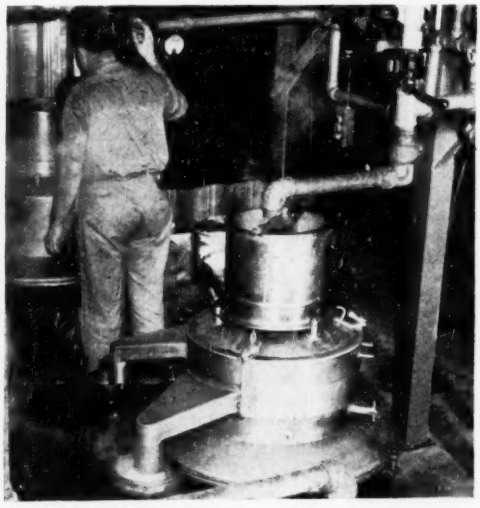
BULK OF SOLIDS is removed from press liquor by centrifuges (center). Liquor goes to stickwater plant.



REMAINING SOLIDS, coagulated by special acidulation process, are separated from stickwater by centrifuging.



OIL is recovered by heating liquor in exchangers (A), delivering to tanks (B), and feeding to centrifuges (C).



IN TWIN-CENTRIFUGE action, oil is taken from press liquor (background) and from stickwater (foreground).

To double-check the drying process, the control laboratory makes periodical moisture analyses of the dried cake, and it keeps the operator of the dryer posted on the results—to aid him in producing a final meal at the desired 8 percent-moisture level.

A word here on the importance of drying the press cake to the proper moisture content: If the moisture runs above 10 percent, spontaneous combustion is likely to occur some time during storage. And the same thing might happen if the screw presses were improperly set so that the oil content of the dried fish meal runs above 12 percent.

Leaving the dryer, the cake falls into a 10 in.-dia. screw-conveyor and goes to a centrifugal fan that, in turn, pneumatically conveys it to a cyclone separator. From here, the dried cake drops into a Reitz disintegrator, where it is milled so that particles will pass through a 100-mesh screen. A horizontal screw-conveyor now carries the ground meal a short distance to a bucket elevator that lifts it 20 ft.—cooling it in the process—and then lets it fall into a 10 in.-dia. pipe feeding it to the manually operated bagging station.

At the end of the pipe are two spouts from which the meal is alternately filled into 100-lb. bags. These bags are stored in the reduction plant for a 3-day cooling.

Clarifying the Press Liquor

Meanwhile, a gear pump has delivered the press liquor to two centrifuges (Sharples Super-D-Canter units) that

operate in parallel. Turning at 3,250 rpm., these horizontal, solid-bowl, conical-type centrifuges separate, each hour, 2,500 lb. of wet fish meal (10 percent of the solids suspended in the press liquor) and 1,800 gal. of clarified press liquor. Wet meal recovered in this manner is mixed with press cake and conveyed to the dryer.

Clarified press liquor flows from the centrifuges into a 200-gal. catch tank. Here, a gear pump delivers the liquor 50 ft. to a 1,500-gal. overhead feed tank in the stickwater plant.

This plant, designed and put into operation by Sharples engineers, is similar to the reduction plant in size and construction. These are the specifications: 120 ft. length, 30 ft. width, 20 ft. height (to the eaves); aluminum sides and roof on steel supports; roof insulated with Fiberglas; floors of concrete.

Two recovery processes take place in this stickwater plant. First, fish oil is recovered; second, solids remaining in the liquor are condensed.

Separating the Oil

In recovering the oil, initial step is to heat the liquor to 200 deg. F. as it is circulated from the feed tank through a heat exchanger (equipped with an automatic temperature controller). Purpose of heating the liquor is to break down the oil and water emulsion for greater oil recovery.

Second step comprises continuous separation of the oil from the liquor by centrifuging. Heated liquor is gravity-fed from the feed tank to the centrifuge (Sharples Nozljector). To keep the centrifuge from running dry, the feed tank has a low-level control and automatic emergency water control. Spinning at 6,000 rpm., the centrifuge recovers 100 gal. of oil an hour. The oil flows into a 200-gal. effluent tank equipped with an automatic level control. Finally, the oil is pumped into storage tanks. And the liquor—now called stickwater—goes into a 400-gal. catch tank.

Stickwater recovery by the Sharples-Lassen process starts at this point. But before the soluble solids in the stickwater can be condensed, about 0.75 percent of insoluble solids and 1.00 percent of oil must be removed.

First Part of New Process

Insoluble solids are removed by chemical precipitation and clarification. In this operation, stickwater is pumped into one of three 10,000-gal. acidulation tanks outside of the plant. As these tanks are being filled, 15 gal. of 66 deg. Bé. sulphuric acid is fed from a small overhead acid-drip tank into the incoming stickwater stream (temperature above 150 deg. F.).

The acid employed here is stored in a 7,500-gal. tank. From this tank, it goes to a calibrated blow tank. Next, the measured amount of acid is transferred into the small drip tanks by means of compressed air.

The amount of acid introduced into the raw stickwater is enough to lower its pH from the 6.5-7.0 range to about 4.5. And when the acid-treated stickwater is held in the acidulation tanks for 30 min., the colloidal proteins coagulate and precipitate. In addition, the proteolytic enzymes are thoroughly inactivated.

Purpose of Removing Solids

Main purpose of removing these proteins and inactivating the proteolytic enzymes is to improve the final condensed fish solubles. As indicated earlier, if they were not removed, the final solubles would be susceptible to decomposition and they would have a strong fishy odor. As is well understood, the higher the quality, the higher the return on the product.

There is another advantage in removing these solids—thermal efficiency of the evaporators for condensing the fish solubles is increased. Feeding stickwater containing these solids to the evaporators brings about considerable encrustation of the solids on the evaporator tubes within a matter of hours. But, with these solids removed, the evaporators can run without loss in efficiency for 30 days or more before they must be shut-down for cleaning.

Start-to-Finish Steps—

in this dividend-paying stickwater reduction operation are graphically portrayed by photo and diagram in this month's special foldout flowsheet. Just turn to pages 96-99.

To continue with the process: Acidulated stickwater is now pumped back to the stickwater plant, where final traces of coagulated solids are removed by a Sharples Super-D-Canter centrifuge operating at 3,250 rpm.

Solids recovered at this point are a highly salable product. They comprise a premium-grade fish meal, since they are extremely rich in riboflavin—30 micrograms per gram as compared to the 1 microgram per gram in ordinary fish meal. In addition, these solids are about 70 percent protein (on a dry basis). Solids recovered at this step may run 50 lb. per 1,000 gal. of stickwater.

Clarified, acidulated stickwater is either picked up by a steam pump and delivered to a 400-gal. catch tank, or it goes to a 25,000-gal. tank outside of the building, to be drawn upon when there are surges in the process. Since there is enough acid in the stickwater to prevent it from decomposing, it can be held in this outside tank for two to three weeks.

Second Part of Process

Now, the additional small amount of oil is removed from the stickwater. From the small catch tank, the stickwater is pumped through a heat exchanger (automatic temperature-controlled), where it is again heated to 200 deg. F. From the exchanger, the liquid flows into another 1,200-gal. steel feed tank. Next, it is gravity-fed into a Nozlejector and recentrifuged at 6,000 rpm. to recover 5 to 10 gal. of oil an hour.

Now, with suspended solids and most of the oil removed, the soluble solids in the stickwater are ready for concentration by evaporation.

Leaving the centrifuge, the stickwater flows into a 400-gal. catch tank. Next, it is pumped into a 25,000-gal. evaporator-feed tank, maintained at a constant high level. This tank has steam coils for heating the stickwater if it must be held for any great length of time.

A centrifugal pump now delivers stickwater to double-effect evaporators, operating on a backward feed. An integrating flowmeter (range: 0 to 45 gal. per min.) feeds stickwater to the evaporators at a rate of 25 to 30 gal. a minute. Handling 1,500 to 1,800 gal. of stickwater an hour, the evaporators condense it to a soluble solids content of 50 percent. Here are the details:

Final Step—Evaporating

Vacuum in the first effect is maintained at 20 in. and in the second effect at 20 to 28 in. Before entering the second-effect evaporator, the stickwater has 7 percent soluble solids. Leaving this second-effect evaporator, the solids are raised to 25-30 percent. And coming out of the first-effect evaporator, the soluble solids have been increased to 50 percent, care being exercised in maintaining the solids content at this point.

Condensed fish solubles are pumped into a 25,000-gal. storage tank outside the plant. Prior to shipping, the solubles are circulated with a steam pump. Finally, the condensed fish solubles are pumped into 1,000-gal. tank trucks, hauled to the railroad yard, and loaded into tank cars.

Sardine canneries that comprise Associated Fish Products Co. are: R. J. Peacock Canning Co., with three plants; Seaboard Packing Co., with three plants; Holmes Packing Co., with two plants; North Lubec Mfg. & Canning Co., with one plant; and B. H. Wilson Fisheries, with one plant.

ESSENTIAL are a skilled staff, supplied with the proper equipment, and having a suitable facility adjacent to the production lines. Such a quality control accommodation is seen above, where E. H. Bagley and author Gould demonstrate the grading of tomatoes for drained weight, wholeness, color, and defects.

Practical Quality Control

The Way to Plan It and the Way to Apply It

Here are the steps for assuring highest benefits—a quality-product program that originates in field, carries on through factory, extends to consumer

WILBUR A. GOULD

Assistant Horticulturist,
The Ohio State University, Columbus

PART I

There are two "musts" in achieving successful quality control. First, the right "tools" must be acquired, and this will be our prime consideration here. Second "must" is use of the right technics—to be discussed in Part II of this article.

But before embarking on any quality control program, top management of the food processing plant should give thought to these three major questions:

1. What Do These Terms "Quality" and "Quality Control" Mean? *Quality* is a concept involving degree—degree of purity, strength, flavor, color, size, maturity, workmanship and condition, or any other distinctive trait or property.

Quality Control is an index for management. It must originate in the field with the raw products and follow through to Mrs. Consumer in the form of the finished product. The quality of the finished product is a result of the intelligent and effective control of the raw products, production practices, packing standards and storage conditions.

2. How Can a Quality Control Program Aid Management? First, the program must originate from top management, and it must be directly

under top management—not under the production or field operations (see Chart below). This is the only set-up that enables the quality control department to function efficiently and do the job assigned to it.

Its primary function is to aid management in the control of production, by giving information on (a) condition and quality of the raw products as received, (b) other ingredients, and (c) packing standards. Also primary is the function of giving specific information to the operating personnel on the control throughout the entire processing procedures. It should provide an index for the production of a quality product, which means that the quality control technologist must set up complete packing standards and procedures for each line, each product, and each grade.

The quality control technologist, on the other hand, should have the authority to disseminate his information to the personnel of the production departments. The latter, in turn, should feel free to seek his advice for the most equitable advancements in the packing of any high quality product.

After the standards are established, the technologist must check and recheck production to see that they are conformed with.

In order to carry out this assignment properly, the quality control department must have a laboratory—not just the old cutting room, nor just a good show place. The most essential points are: It should be close to the factory production lines, but apart from them; it should afford sufficient space for staff, equipment, and for making analyses; north light for grading tables, if at all possible; and general equipment, such as scales, trays, screens, can opener, headspace gage, vacuum and pressure gage, incubators, sinks, electric and gas outlets, and sufficient storage space for samples.

In addition to the above, considerable specific equipment will be found essential, depending on the lines, control desired, and the ability of the technologists. For a tomato and tomato products line, the following pieces of equipment are essential: (1) A complete set of Munsell color charts, preferably with spinners and color comparators; (2) consistometers; (3) viscosimeters; (4) Howard mold counting equipment and microscopes, and (5) specific gravity equipment (Abbe or hand refractometer or the Sprague cup). There may also be included specific research equipment, glassware, chemicals, and, possibly pilot equipment—all depending on the plant's operations and qualifications of the technical personnel.

The pilot operation is the ideal of all technologists, and in those cases where installed, it usually saves money, time and large scale experimentation.

3. Who Is Going To Do This Work? The type of staff for the quality control department will vary with the products being packed, size of operation, and the amount of control desired. These are all factors that management must consider in selecting this personnel.

The quality control technologist must be—

a. Well trained in fundamental sciences; laboratory organization; factory layouts, including specific flow diagrams; and routine testing.

b. Able to suggest new procedures that will benefit management in packing a high quality product.

c. Able to interpret his results rather than just record them.

d. Able to write and speak well, since he has a big selling job.

e. Thoroughly familiar with food regulations, standards and labeling practices, including federal, state and local policies.

f. A "storehouse" of all new information on up-to-date practices and procedures.

g. Honest and unbiased in his decisions.

h. Alert, always on the job, and quick to make decisions.

He must keep a complete record of the entire pack by coded lot numbers so that he can, at a moment's notice, ascertain exactly the complete history of any portion of the pack. In addition to his work sheet or daily record forms, he must make a brief and simplified daily report for top management. The following factors should be reported for each day's operations: Cases packed, code, grade, and recommendations.

In addition to this daily report, he should submit suggestions periodically on (a) new technics, (b) changes in methods of production for better quality products, (c) sanitary technics and methods—along with all up-to-date information to help management solve the many problems in the actual processing of high quality products.

"Know-What" on Standards

The Federal Food, Drug & Cosmetic Act of 1938 cornerstones the interest in quality studies today. The administrator has the power to promulgate reasonable standards of quality whenever, in his judgment, "such action will promote honesty and fair dealing in the interest of consumers," (Section 401).

These yard-sticks—the trade calls them "minimum standards of quality"—are for interstate shipment of products for which standards have been established. Furthermore, they are used by USDA for dividing Grade C (or Standards) and Grade D (or substandard).

In the Minimum Standards of Quality for vegetables, emphasis is on freedom, or absence, of defects and maturity of the vegetable in question. This is as it should be, since consumers do not want overmature, inedible, or extraneous matter in their products.

The industry accepts these measurements, and in many cases they have worked very closely with the F&DA in their development.

The new proposed standards for sweet corn represent a good illustration

A "Working" Pattern for Effective Control

Factors to check . . .

TABLE—FACTORS In Grading of Canned Tomatoes (USDA)

A—Drained Weights, 20 Points

Classification	Score Points	Drained Tomatoes Percent	Container Sizes, Dimensions in In., and Maximum Allowable Head Spaces, Measured From Top of Double Seam (16ths of an In.)				
			Picnic 2 11/16 x 4 8.8	No. 303 3 3/16 x 4 6/16 9.4	No. 2 3 7/16 x 4 9/16 9.7	No. 2½ 4 1/16 x 4 11/16 9.9	No. 10 6 3/16 x 7 13.6
			Minimum Weight				
			Ounces	Ounces	Ounces	Ounces	Ounces
Grade A Whole	20	63	7	10 1/2	13	18 3/4	68 3/4
	19	61 1/4	6 3/4	10 1/4	12 1/2	18 1/4	67
	18	59 1/2	6 1/2	10	12 1/4	17 3/4	65
Grade A	20	70	7 3/4	11 3/4	14 1/2	20 3/4	76 1/2
	19	68	7 1/2	11 1/2	14	20 1/4	74 1/2
	18	66	7 1/4	11	13 1/2	19 3/4	72 1/4
Grade B	17	63	6 3/4	10 1/2	13	18 3/4	69
	16	60	6 1/2	10	12 1/4	17 3/4	65 1/2
	15	58	6 1/4	9 3/4	12	17 1/4	63 1/2
Grade C	14	55	6	9 1/4	11 1/4	16 1/2	60 1/4
	13	52	5 3/4	8 3/4	10 3/4	15 1/2	56 3/4
	12	50	5 1/2	8 1/2	10 1/4	14 3/4	54 3/4
Grade D	11 or less	< C	< C	< C	< C	< C	< C

B—Wholeness, 20 Points

	Points	Percent of Drained Weight
Grade A Whole	18–20	95
Grade A	18–20	80
Grade B	15–17	70
Grade C	12–14	70

C—Color, 30 Points

	Points	Percent Tomato Red
Grade A	27–30	90 (<5 percent yellow)
Grade B	23–26	50
Grade C	19–22	<50
Grade D	0–18	<C

D—Absence of Defects, 30 Points

	Points	Details
Grade A	27–30	No harmless extraneous materials, 1/2 sq. in. skin per lb., 2g. core material, no blemished portions
Grade B	22–26	No harmless extraneous materials, 1 sq. in. skin per lb., 6g. core material, 1/8 sq. in. blemished portions
Grade C	17–21	1 small piece extraneous material, 1 sq. in skin per lb., 1/4 sq in blemished portions
Grade D	0 –16	Fail to meet requirements

. . . and sheet on which to score them

UNITED STATES DEPARTMENT OF AGRICULTURE
Production and Marketing Administration
Washington 25, D. C.

SCORE SHEET FOR CANNED TOMATOES
(Effective August 1, 1946)

Container size															
Can mark															Average
Label															
Net weight (in ounces)															Oz.
Vacuum readings (in inches)															—
Drained weight (in ounces)															Oz.
FACTORS	Score Points														Average Score
I. DRAINED WEIGHT	20	(A) 18–20													
		(B) 15–17*													
		(C) 12–14*													
		(D) 0–11*													
II. WHOLENESS	20	(A) 18–20													
		(B) 15–17													
		(C) 12–14*													
III. COLOR	30	(A) 27–30													
		(B) 23–26*													
		(C) 19–22*													
		(D) 0–18*													
IV. ABSENCE OF DEFECTS	30	(A) 27–30													
		(B) 22–26*													
		(C) 17–21*													
		(D) 0–16*													
TOTAL SCORE	ADD														
GRADE															
NORMAL FLAVOR AND ODOR															

(*) - Indicates limiting rule within classification.

of the harmony that exists between this regulatory agency and the trade. With fruits, emphasis is placed on character and freedom from defects. Here, "character" represents the stage of maturity and appearance of fruit.

These standards are a great improvement over the earlier ones, where syrup concentration was considered as the criterion of quality. They have done much to raise the quality of fruit packs and represent industry's ideal.

Industry can expect considerable emphasis to be placed on these types of quality levels. And they will probably be mandatory on all processed fruit and vegetable products shipped interstate.

The quality control technologist must be thoroughly familiar with all of the fine points of the Federal Food, Drug & Cosmetic Act of 1938 in order to do his job properly. A copy of this act is available from the Federal Security Agency. Our accompanying table gives the USDA's factors of quality, and right below it is the specific score sheet for grading canned tomatoes.

"Know-How" on Methods

The chart on p. 59 shows a breakdown of the different types of tests employed in determining quality. This chart is not intended to cover all phases, since the specific measurements divide themselves into many groups, depending on the interest of the technologist.

It finds application in the field operations for the determination of (a) varieties suitable for processing, (b) the proper stage to harvest the different products, and (c) methods of evaluating residues and flavors imparted by insecticides and fungicides.

At the processing plant, applications start with the grading of raw products, as the basis of pay to the farmer. Here, waste, extraneous material, maturity, and other factors are also determined.

In the factory, the technologist determines the efficiency of washing, sorting, trimming, peeling, blanching, cooling, brining or syruping, filling, packaging, and coding.

Finally, he must apply quality indices to evaluating the grade of the finished product, the same as he did with the raw product. He determines the workmanship of the entire operation, uniformity of samples, maturity, general appearance and flavor. These checks are made of each day's pack. Moreover, competitors' packs are rated for comparison.

A careful breakdown of necessary tests for the proper application of quality control will be given in Part II of this article, to be published in a subsequent issue of FOOD INDUSTRIES.

Three Mechanical Sentinels Boost Output and Quality

Installed by western brewer, these automatic units bring precise operating data—and plant now enjoys new level of performance

RAY BLOOMBERG
Northwest Correspondent, "Food Industries"

A notable increase in operating efficiency and a marked improvement in quality control have been obtained by the Olympia Brewing Co. of Olympia, Wash., on its two bottling lines—through installation of three special electronic devices.

The late Frank T. Schmidt, bottling superintendent, is credited with preliminary design of the set-up, and the instruments were subsequently supplied by Leeds & Northrup Co. of Philadelphia.

One of the devices—a bottling recorder—registers the rate of production and keeps tab on every lost second throughout a 24-hr. day. And so effective has been this installation that operating-time efficiency has increased more than 5 percent.

The other devices are: A station recorder, which checks temperatures at various points in the soaker and pasteurizer, thus advancing quality control; and a special thermocouple that records bottle-contents temperature during pasteurization, assuring uniformity of heating.

Delays Targeted

The Olympia Brewing Co. long has believed in close control over its bottling lines and, before installation of the electronic devices, kept elaborate record forms on which the workmen noted the reason for every delay, no matter how small. Regardless of how carefully records were kept, however, the company was unable to account for all lost time. As a result, operating efficiency never exceeded 94 percent.

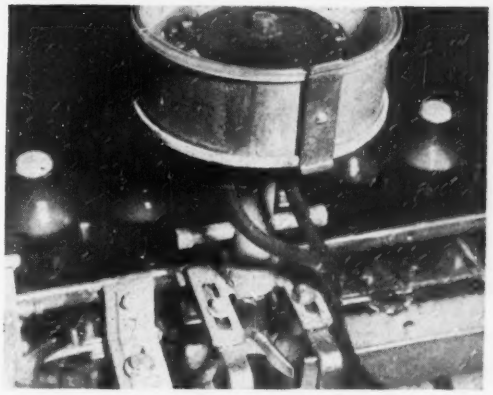
But since installation of the bottling recorder, lines that formerly produced 550 cases an hour are now bottling 580 to 600 cases. Operating efficiency sometimes is maintained at 100 percent through an entire shift, and it averaged 99.396 percent during a recent extended production period.

The 100-percent efficiency point is determined by the normal capacity of the filling machine—i.e., 280 bottles per min., the rate at which the bottling line has been found to operate at its greatest efficiency.

Impulse Receiver Used

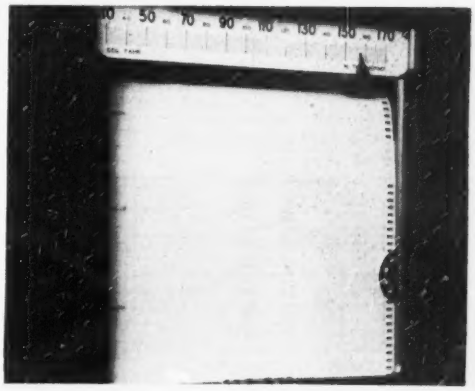
Specifically, this equipment comprises a six-pronged star wheel on the bottle conveyor, between the filler and the pasteurizer (see photo above). Each filled, capped bottle traveling down the line moves this star wheel and, through a special contact assembly with a one-lobe disk and ball-bearing rider, sends impulses over a wire to actuate a six-digit counter in the recording instrument, located in the foreman's office. Another contact assembly, with a three-lobe disk, provides impulses for the high-rate impulse

1. Bottling Recorder—



. . . ups operating efficiency to 99%

2. Station Recorder—

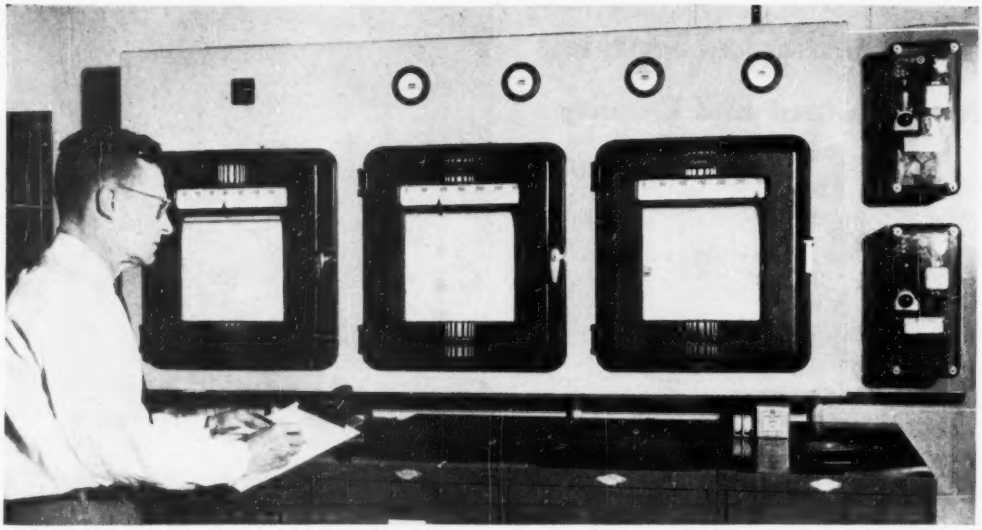


. . . improves pasteurization

3. Product Temperature Recorder—

. . . augments beverage uniformity

Compact Panel and Charts Tell What's Happening



INSTRUMENTS in foreman's office keep him informed as to bottle-shop performance. Recorder (left) shows progress of pasteurizing cycle determined by thermocouple in bottle (see chart close-up below). Others indicate speed of the two bottling lines. "Time on" and "time off" clocks are shown above each of the latter recorders.

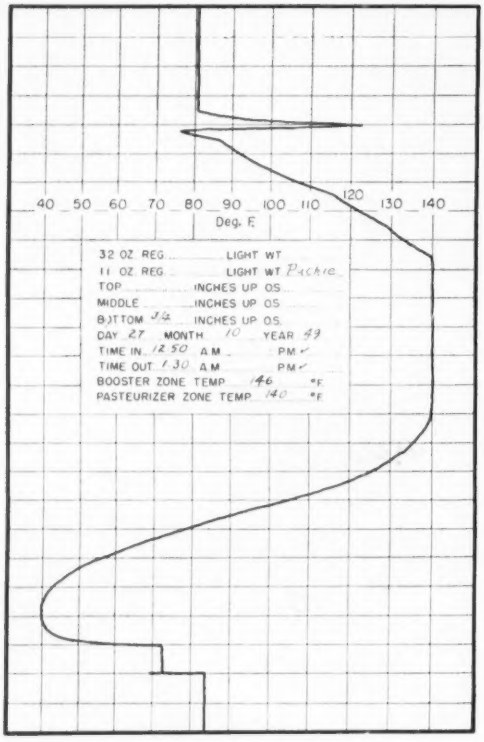

40 50 60 70 80 90 100 110 120 130 140
Deg. F.
32 OZ. REG. LIGHT WT
11 OZ. REG. LIGHT WT Pacific
TOP INCHES UP OS.
MIDDLE INCHES UP OS.
BOTTOM 3/4 INCHES UP OS.
DAY 27 MONTH 10 YEAR 49
TIME IN 12:50 A.M. PM
TIME OUT 1:30 A.M. PM
BOOSTER ZONE TEMP. 146 °F.
PASTEURIZER ZONE TEMP. 140 °F.

CHART shows actual temperature changes of beer in Major interruption in standard performance (bottom of chart) is pin-pointed by foreman's notation.

receiver, which has a rectifier-type voltage source (125v. d.c.) (see drawing on opposite page).

The recorder is a potentiometer of the single-point, curve-drawing-type that makes a continuous record. It has a range of 0 to 300 bottles per. min., corresponding to 0 to 100 impulses per min. The recorder has been designed to operate satisfactorily at a minimum of 40 impulses per min.

A record is maintained on a strip chart which moves at the rate of 3 in. per hr. Figures at the top, from 3 to 300, indicate bottles per min. Connected with the recorder are two clocks, one totaling in minutes all the "time on", and the other all the "time off."

When the bottling line is operating at capacity, the line on the chart oscillates uniformly. But, should there be a gap of even a single bottle, the trace on the chart varies slightly. Should 7½ sec. elapse without a bottle passing, the "time on" clock stops and the "time off" clock starts. Subsequently, when a bottle again goes past the wheel the "off" clock stops and the "on" clock resumes.

Reasons for the stoppages are written on the chart by the shift foreman. These include: Shift changes, lubrication of machines, broken filler tubes, washing machine interruptions, sticky crowns, etc.

True, these stoppages are the same as those which occurred before installation of the electronic device. But the recorder now points the finger at them so effectively that the company has been better able to move against delays and reduce them to a minimum.

Each day, information from the recorder is transcribed on a special six-months wall chart known as the Production Micromax. This chart is divided vertically into days, horizontally into minutes. A red line records the total time lost; a blue line the necessary time lost—greasing, shift changes, power interruptions, and the like; and a purple line the avoidable lost time—such as washing machine interruptions, sticky crowns, and broken filler tubes.

Information from this chart has notably helped the company in the analysis of operational stoppages, thus enabling quick corrections.

So much for the device that effected the striking improvement in operating-time efficiency. Now for the two units used in quality control:

The first of these is a station recorder which checks the temperature at each station in the soaker and pasteurizer (see photo (2) first page of article). These temperatures are extremely important in the critical zones of the pasteurizer. For a deviation of a degree or two for even a minute or two at the critical temperatures can definitely affect the taste of the beer and the quality of pasteurization.

The station recorder operates through thermocouples of the conventional bi-metal coupling type. These are inserted in each of the separate tanks of the soaker and the pasteurizer. The recorder contains a slowly-revolving roll of ruled paper 40 yd. long—enough to last two weeks of 24-hr. days. This roll is divided horizontally into the hours of the day and vertically into degrees of temperature, from 30 to 170 F.

An automatic selector calls for the temperature at one of the 16 stations every 55 sec., with the result that each station is called every 5 min. throughout the 24-hr. day. As each station is called, its number is posted automatically on the chart. If the temperature is as desired, the number will fall exactly on the vertical line indicating that temperature. If it is higher or lower than desired, the station number will fall on one side of the line or the other.

The "critical" zones in the pasteurizer are the pre-heat and pasteurization zones. At these two stations, a red light flashes on and an alarm bell rings when the temperature varies as much as ½ deg. The signals continue in operation until proper adjustments are made.

To make sure temperatures at the remainder of the stations are at the desired levels, the shift foreman frequently inspects the conveniently-located chart. If a station number on the chart follows a straight vertical line, everything is in order. But if the numbers veer to one side of the line, the pattern is readily discernible and the foreman can effect adjustment. When variations in temperatures occur, there is usually a good reason—and the foreman writes that reason on the chart. After the chart has been completely used, it is rolled up and saved for reference.

The station recorder has no direct control over temperature. The needed adjustments are made by the conventional automatic temperature controls found on most soaking and pasteurizing machines.

Bottle-Contents Temperature

With this new station recorder installed, the company had a good check on the temperature in each tank in the pasteurizer, but it still had no way of checking the temperature within a bottle. So this problem was attacked. And now this information is obtained by clamping a thermocouple in the bottle as it travels through the pasteurizer (see photo (3) on first page).

By this method, Olympia has been able to disprove the former theory that beer mixes when there is thermal action within the bottle, thus attaining a uniform temperature at every level. The company has found that the temperature varies as much as 4 deg. throughout the bottle in even a "stubby." It had discovered that the thicker the bottle, the slower the transfer of heat to the contents. Therefore, weight (accordingly, thickness) of its bottles has been reduced from 9 to 7½ oz., and without reducing their strength. As a result of this information, the company has been able to reduce by 4 min. the time required for each bottle to travel through the pasteurizer.

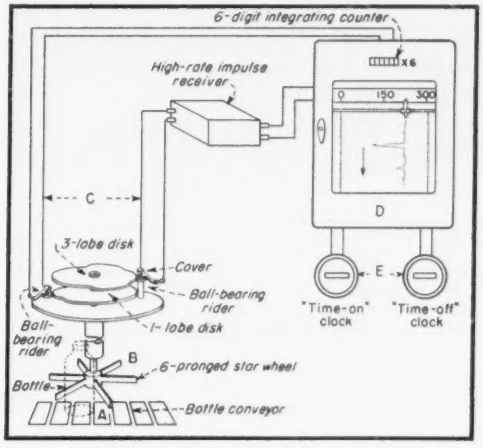
The thermocouple is connected with a Micromax temperature recorder in the control room, where each trip is automatically charted. Each 24-hr. chart is then stored in the record room for future reference.

Today, the thermocouple is used to check bottle temperatures three times every shift. It is positioned within the bottle so its tip reaches to within ¾ in. of the bottom, the point where the temperature was found to be the lowest.

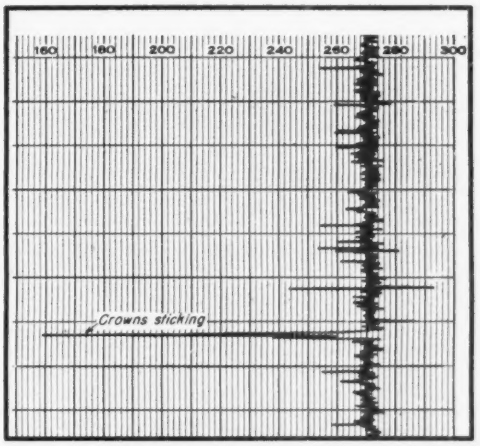
Internal temperature of the bottles, as they enter the pasteurizer, is 44 deg. F. Pasteurization temperature is obtained by a rain-type spray of hot water that falls on the outside of the bottles.

As the water sprays over the bottles, the beer is heated and the water is cooled and trapped in a particular section. This water, in turn, is pumped to a section farther down the pasteurizer, where it is allowed to rain over the bottles to effect a cooling of the beer, thus completing a cycle. The final cooling is accomplished by fresh, cold artesian well water and the beer leaves the pasteurizer at 80 deg. F.

Bottling Unit Hook-Up and Graph

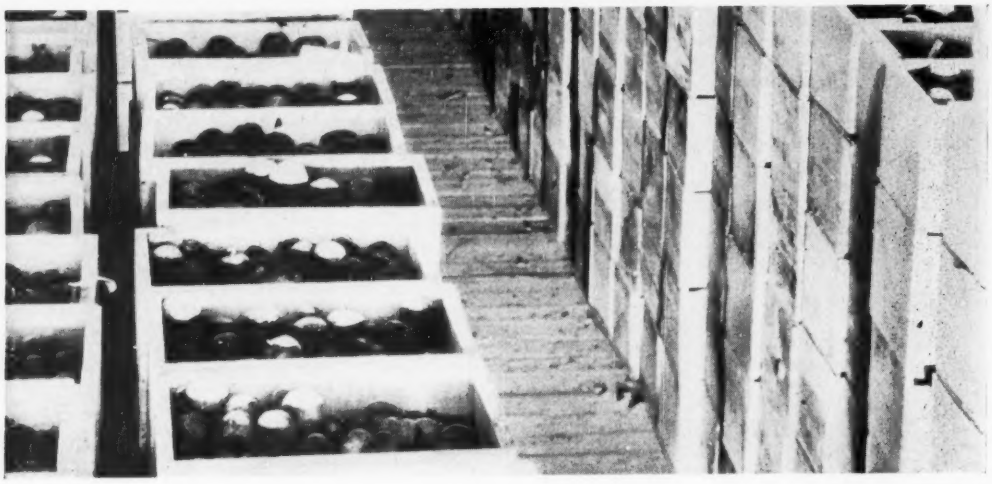


SCHEMATIC DRAWING of bottling recorder. Bottles, traveling on conveyor (A), turn star wheel (B), which produces impulses that travel over wires (C) to recording potentiometer and integrating counter (D), located in foreman's office. Clocks (E) indicate total "on" and "off" time.



ACTUAL STRIP-CHART from potentiometer—(D) above—shows better than 270 bottles being filled per minute. Small swings off center indicate "misses" of a few bottles. Major interruption in standard performance (bottom of chart) is pin-pointed by foreman's notation.

RIGHT WAY—Air space between stacks, temperature low and even, boxes slack filled



Stored Apples

Why They're Lost and How They're Saved

To increase storage life of this fruit, considerable care is required in the picking, handling, and temporary storage steps. And it is also important that measures be taken to reduce blue-mold infection and guard against scald

LOU BISNO

Bakery Chemist and Production Consultant, Burbank, Calif.

PART II

To a large extent, picking, handling and temporary storing methods influence the keeping quality of apples in long-time storage. For it is in these pre-storage operations that injuries and blue-mold infection are introduced.

The effects on apple storage life of variety, uniform grading and proper maturity were discussed in Part I of this three-part article. Now, let us consider the control of scald. Proper maturity is only one element in its control. Use of shredded oiled paper in the storage containers adds a high degree of control through absorption of the gases favoring scald. With proper use, less scald develops throughout the entire storage period than is usually shown three months earlier.

This paper must carry at least 15 percent of its finished weight in odorless, tasteless mineral oil—18 to 20 percent is preferred. And ½ to ¾ lb. of the shredded paper should be evenly distributed through each barrel of apples. Quality of paper varies with susceptibility of the particular variety to scald development. The most troublesome varieties are: Grimes Golden, Stayman Winesap, Black Twig, Rome Beauty, Cortland and York Imperial. But no variety is entirely immune.[5] Effectiveness of packing in oiled paper to control scald is illustrated in photo on opposite page.

Picking Uniform Sizes

Apple size is significant for storage evaluation with relation to firmness and keeping quality. Other conditions being equal, smaller apples are generally firmer than larger ones.

Recently, however, labor conditions have resulted in the simultaneous picking of small apples (diameter of 2¼ in. or under) with the larger ones. These small apples have not matured satisfactorily and are, therefore, likely to show lower test pressures than apples in the 2½-to-2¾-in. range, and a darker green background in skin color. In the 2½-to-3-in. range, pressure tests are usually more consistent and skin color is generally more uniform than when the 2¼-in. size is included in the picking.

One might conclude that permitting the bulk of the fruit to reach a large size before picking would be a desirable practice. But this alternative involves several dangers—the apples may fall, or firmness may diminish to a point that affects keeping qualities.

Table I shows the reduction in test pressures when intervals of 14 to 20 days elapsed between pickings. Data applies to apples grown at Arlington, Va.[6] Pressure differences indicate that, in the case of the later pickings, reduction in storage life of 45 to 75 days may be expected.

An indication of the relationship between the average pressure tests and the percentages of rot is given in Table II, in which a number of boxes of the York Imperial variety were checked.

Numerous factors that are controllable in the orchard also affect the storage life of apples. For instance, insufficient spraying may result in worminess or infection of the fruit.

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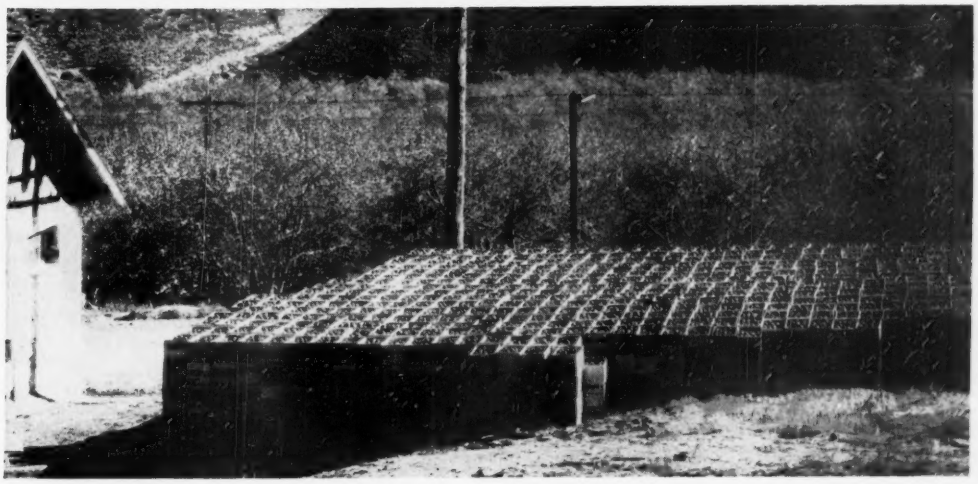
WRONG WAY—Stacks too tight, fruit exposed to sun and rain, no temperature control



Moreover, permitting apples to rot on the ground may spread bacterial or mold contamination to sound fruit. And high nitrogen treatment, in the case of Grimes Golden trees, results in a relatively high percentage of soggy breakdown, particularly with deferred storage. Incidentally, excessive rainfall, toward the end of the growing season tends to produce fruit of inferior keeping quality. It is also noted that fruit from young trees does not keep as well as that from the older ones.

Blue Mold Causes Losses

Another important factor that influences the keeping quality of apples is injury to the fruit. Such damage may occur in the picking operation, in the picking container, in the orchard crate, or in the final packing container.

By far the greater proportion of storage rots—at least 80 percent[2]—is due to blue-mold infection. Decay of this type may be reduced by elimination, to the greatest practical extent, of injuries to the apples, and reduction of exposure to mold.

Injuries inviting mold infection are bruises and skin perforations, which may occur as the result of: (1) Rough handling during picking; (2) rubbing of apples against each other in the picking container, or leaning of the picker against the container; (3) pressure within the orchard crate or final storage container; and (4) inadequate mechanical-grading equipment, or its improper use.

Other skin breaks that permit mold infection may be due to open lenticels or dots, or worminess, San José scale and scab. In the two latter instances, small skin openings result to provide entrance for the mold.

In picking the apples, care must be used in order to eliminate tearing at the stem end. The picker's finger-nails should be closely trimmed to prevent punctures. Buckets are preferable to bags, in that their use affords better protection against bruising and stem punctures. Data[4] show (see Table III) that over 90 percent of the apples were uninjured when the buckets were used—almost a three-fold improvement over results obtained with bags.

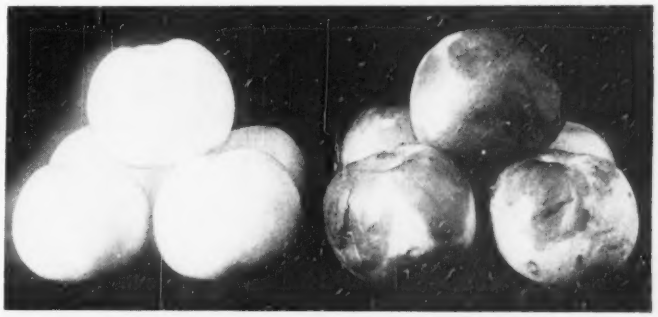
Orchard crates or field boxes should be so filled that, when they are stacked, pressure on the fruit is avoided. When slatted crates are used, cuts in the apples skins are a possibility. To prevent this, rounded edges on the slats are desirable. Solid-wall boxes are, however, preferable.

A frequent cause of bruising is inadequate or overloaded grading equipment. It is not uncommon, during the peak of the picking season, to see the fruit piled two or more high at some points on the grader. This practice results in incomplete grading for size, also bruising, and there may be partial failure to remove off-grade apples at the take-off points.

Although hand-grading eliminates some of the dangers of physical damage, it is practical only in small packing operations. The logical way to eliminate the difficulty encountered in mechanical grading is to use experienced operators, or have exacting supervision (see cover picture illustrating an efficient mechanical grading operation).

Packing Houses

In addition to the physical condition favoring entrance of mold spores, the presence of these spores in significant quantity deserves special consideration.



EFFECTIVENESS of oiled paper in control of scald is demonstrated by the condition of these Yellow Newton apples. Left: After 9-months' storage in oiled-paper wrappings. Right: Stored for same period, but not wrapped.

BEST PROCEDURE: Pick at proper time, using buckets, and don't delay storage

TABLE I—FIRMNESS DIMINISHES When Apples Are Picked Too Late

Apple Variety	Time Between First and Second Picking Days	Pressure Tests: First Picking Date	First Picking Pressure	Second Picking Date	Second Picking Pressure	Pressure Decrease
Baldwin....	14	9/20	18.0 lb.	10/4	16.5 lb.	1.5 lb.
Ben Davis..	20	9/20	21.2 lb.	10/10	19.3 lb.	1.9 lb.
Winesap....	20	9/20	23.6 lb.	10/10	21.2 lb.	2.4 lb.

TABLE II—PRESSURE TESTS Indicate Percentages of Rot Development (York Imperial Apples)

Box Number	Average Test Pressure	Percent Rots
5	16.38 lb.	0.56
3	14.29 lb.	0.68
1	14.65 lb.	1.52
4	14.18 lb.	1.72
2	12.39 lb.	2.87

TABLE III—BUCKETS Are Better Picking Containers Than Bags

Orchard	Picking Container	Extent of Damage, Percent: Uninjured	Slightly Bruised	Badly Bruised	Skin Punctured
A	Bag	34.1	13.9	50.2	1.8
B	Bucket	96.1	2.3	1.3	0.3
C	Bag	30.1	24.2	41.2	4.5
	Bucket	92.5	7.1	0.3	0.0

TABLE IV—DELAY Between Picking and Storing Promotes Scale and Decay

Damage	Percentage of Defective Apples, 3-Year Average: Immediate Storage, Yellow Newton	Immediate Storage, Rome Beauty	Storage After 2 Weeks, Yellow Newton	Storage After 2 Weeks, Rome Beauty
Bad scald at withdrawal....	11.0	22.2	30.2	27.9
Ten days later.....	28.2	42.5	56.5	67.1
Decay at withdrawal.....	0.8	1.7	1.9	3.7
Ten days later.....	5.2	13.6	14.4	21.5

According to Baker and Heald[1], reporting on control of blue-mold decay of Washington apples, the packing-house is the principal source of contamination. Important factors are: Accumulation of contamination on all fruit and boxes passing through the packing house, and growth of the fungus in it, particularly in damp places or where the air circulation is poor.

Contamination may result from the air, equipment, or containers, or even in washing machines, unless special precautions are taken to remove accumulated mold spores from this equipment.

Open lenticels are an important source of decay under severe exposure to mold. English, Ryall, and Smith[8] investigated handling practices with relation to blue-mold decay and washing practices in Delicious apples and they report:

"Cold storage for two, six or ten weeks prior to washing resulted in increased resistance to washing injury, the increases in general being proportioned to the length of the storage period.

"Passing apples through a heavily contaminated washing solution, followed by a relatively clean rinse, caused only a small amount of decay, whereas subjecting the unwashed fruit to a special rinse containing a high population of blue-mold spores resulted in a greatly increased number of infections.

"Where an adequate final rinse of clean water was used, the addition of spores to the acid solution caused only slightly more decay than when uncontaminated solutions were used.

"The importance of careful handling in the control of blue mold decay is emphasized by the fact that many of the lenticel infections occurred in bruised areas."

While it is not practical to control the number of open lenticels, the fact remains that fruit from some orchards is more susceptible to decay from this source of infection.[5] Methylene blue is a good indicator for open lenticels.[1] In making the test, the whole apple is immersed in a weak solution of methylene blue. The open lenticels become apparent by the discoloration appearing at those points. Fruit showing an exaggerated condition should, other conditions being equal, be used before fruit showing a lesser number of openings.

Injuries favoring mold development may, as stated, occur through faulty containers. The bushel baskets, boxes, or crates—whichever are used—should be:

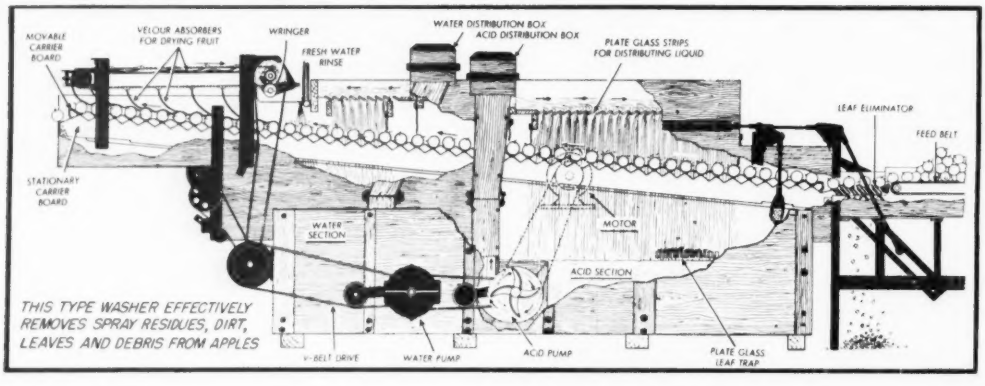
1. Firm enough to resist damage in handling or when piled in storage.
2. Sufficiently smooth inside to eliminate bruising or cutting of the fruit.
3. Relatively free from mold or mold spores.
4. Provided with covers and pads for sides and top.
5. Filled to such a level that no crushing of the fruit occurs in storage.

For apple storage, it is not an uncommon practice to use second-hand containers showing high mold counts. In a special investigation, working with wooden squares cut from the sides of apple boxes, Baker and Heald[1] found heavy contamination, even after exposure to outdoor conditions for nine months. To make this check, the apple boxes had previously been dipped in a suspension of spores of *Penicillium expansum*, the blue-mold commonly found on apples.

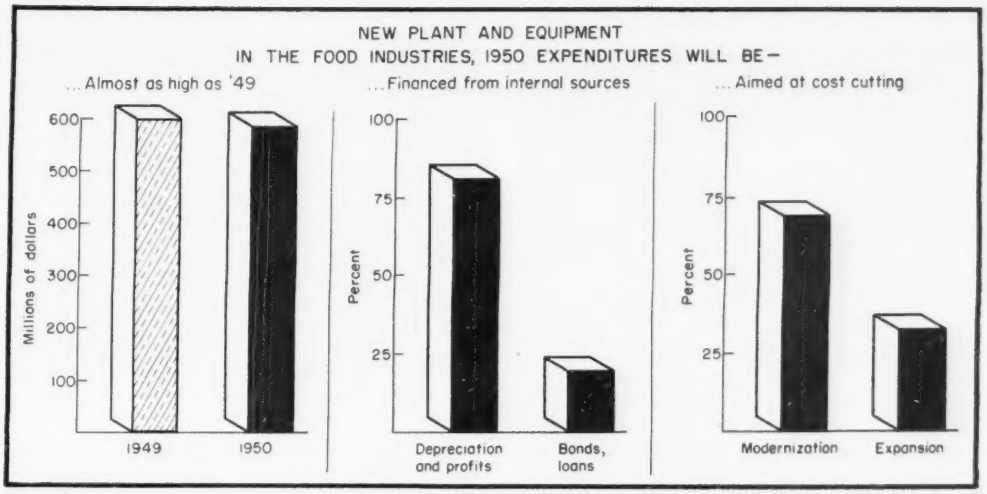
Wellman and Heald[8] have shown the

(*Turn to page* 184)

Rids them of those unwanted "extras"



THIS TYPE WASHER EFFECTIVELY REMOVES SPRAY RESIDUES, DIRT, LEAVES AND DEBRIS FROM APPLES



Food Plant Investment Stays High

Advance survey indicates a 1950 outlay of $585,000,000 for modernization and expansion of food equipment and plants

CAPITAL INVESTMENT for new food plants and equipment in 1950 adds up to 10 percent more than was planned a year ago for 1949. The annual McGraw-Hill survey on industry's investment program shows the food industry figuring to spend $585,000,000. The planned total for '49 was $525,000,000.

Comparison of last year's advance survey with actual investment during the year emphasizes the fact that plans for capital investment can be revised promptly as economic conditions change. Food industry's actual expenditure, during 1949, came to $600,000,000—about 14 percent more than advance computations indicated.

For all industry, outlay exceeded plans by 1 percent. And a similar increase could be repeated this year if the pattern reflected by the overall industry survey is carried out.

Current Level Low

Industry as a whole—manufacturing, mining, transportation and utilities—expects to invest $12,400,000,000 on modernization and expansion in '50. This outlay is only 13 percent less than was actually spent in 1949. This survey, moreover, along with government surveys on business expenditures, indicates that the current level will be the year's low point and that the second, third and fourth quarters of 1950 should either hold even or show an uptrend.

Food manufacturers expect to increase sales by about 1 percent, while manufacturers as a whole look to maintaining volume at about the '49 level. All manufacturing capacity, on the other hand, will be increased by 3 percent during the year, while food producing capacities will expand by 4 percent.

Bulk of the investment funds, however, will go for replacement and modernization of existing facilities, which continues the shift away from expansion reported last year. Food producers will devote 68 percent of their new investment to modernization, leaving 32 percent for expansion. Manufacturers as a whole will use 65 percent of their investment for modernization.

There are wide variations among the branches of the food industry, however, on the apportionment of new funds. Beverage makers, including brewers, plan to use more than 50 percent of their new investments on expansion. Bakers, canners, and cereal manufacturers, on the other hand, will turn 90 percent or more of their new investments into modernization of existing plant and equipment.

As is the case for all manufacturing, the capital investment program planned by the food industry will make little headway in overcoming accumulated needs for new plant and equipment, as shown in earlier surveys. Of a total investment of $6,300,000,000 planned by all manufacturing for the year, $2,200,000,000 will be used for expansion and at least $3,500,000,000 will go to offset the year's wear and tear on plant and equipment. This leaves just a little over $500,000,000 to improve technical efficiency spread over all manufacturing operations. Last year manufacturing companies indicated that it would take almost $20,000,000,000 to put their facilities in first class shape.

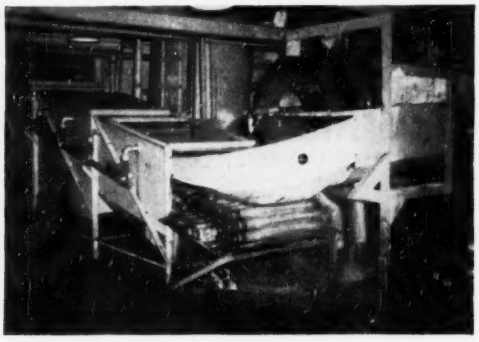
HOW MANUFACTURERS plan to Divide 1950 Expenditures Between Expansion and Modernization

	Percent for Expansion	Percent for Modernization
Food	32%	68%
Autos	32	68
Chemicals	60	40
Machinery	11	89
Electrical machinery	15	85
Petroleum refining	37	63
Transportation equip.	3	97
Textiles	35	65
Steel	14	86
Other manufacturing	35	65
All manufacturing	35	65

PACKING QUALITY PICKLES: Washing Is Key Step

1 **CUCUMBERS,** covered with field dust and dirt, arrive in baskets at receiving station of pickle plant.

2 **SLATTED CONVEYOR** feeds cucumbers to machine (foreground) that grades them by diameter.



3 **THEN** following soaking, they are washed in rotary unit (right) and cleaned by pressure spray (left).

Germicidal Detergents Are Not Needed For Washing Fresh-Picked Cucumbers

Tap water or 30-deg.-salometer brine give as effective results as water containing either of the two quaternary ammonium compounds tested

F. W. FABIAN and M. D. ORLOFF

Section of Bacteriology,
Michigan Agricultural Experiment Sta., East Lansing, Mich.
With photos courtesy Vita Foods Co. of Maryland

Results of studies at Michigan Agricultural Experiment Station clearly show that it is not necessary to use quaternary ammonium compounds, such as Emulsept (acyleolaminoformylmethyl pyridinium chloride) and Roccal (alkyldimethyl-benzylammonium chloride), for washing fresh cucumbers before processing.

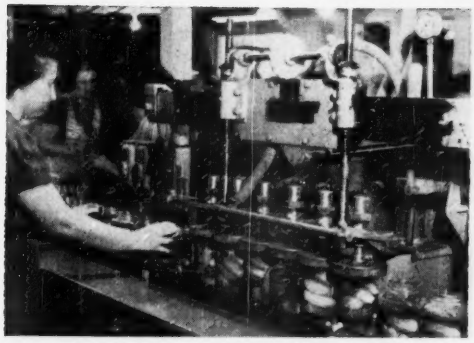
■ **The fact is that these germicidal detergents effect no greater reduction in the total microorganism plate count than do 30-deg.-salometer brine or plain water.**

Many inquiries about the advisability of using quaternary ammonium compounds for washing cucumbers prior to canning prompted the studies. The inquiries, in turn, were stimulated by the published report, of Bernstein and Epstein[1], that use of Emulsept gave beneficial results. They stated that the average total plate count of 11,500,000 microorganisms per ml. before washing was decreased to an average count of 60,000 per ml. after washing in tap water in the pre-soaking tank and to an average count of 3,000 per ml. after washing with Emulsept in the pre-soaking tank.

Preparing the Samples

For comparison, the Michigan State College study included Roccal, another quaternary ammonium compound, which is not recommended, so far as known, for washing cucumbers.

In the first experiments, cucumbers were obtained as



4 **BRINE** is automatically measured into jars of cucumbers to provide uniform, minimum headspace.

5 **LEAVING** pasteurizer, jars are washed and pickles are cooled to under 100 deg. F. by water sprays (right).

they were delivered to a receiving station, and they were divided into three 10-lb. lots. Washing procedure was as follows:

Lot 1—for 30 min. at 110 deg. F. in 30-deg.-salometer brine.

Lot 2—for 30 min. at 110 deg. F. in a 30-deg.-salometer brine to which Emulsept was added at the rate of 1 oz. per 5 gal. of brine—the strength recommended by Bernstein and Epstein. This addition represents a dilution of 1:6400, or 156 ppm., since the commercial aqueous solution contains only 10 percent active ingredients.

Lot 3—for 30 min. at 110 deg. F. in a 30-deg.-salometer brine to which Roccal was added at the rate of 1 oz. per 5 gal. of brine.

Bacteriological Tests

After these lots were washed, 20 representative cucumbers were picked at random from each and aseptically peeled using sterile rubber gloves and a sterile knife. Peelings (20-g. portions) were weighed into a sterile bowl of a Waring Blender together with 180-g. of sterile distilled water. Then the mixture was ground for 5 min.

Dilutions were made by weighing 10-g. of the ground mixture into a 90-ml. sterile water blank. After this suspension was shaken 25 times, further desired dilutions were made for plating purposes. The plates inoculated from these dilutions were incubated at 32 deg. C. for 48 hr., except that the yeast plates were incubated for 5 days at room temperature.

Total plate counts were determined by using tryptone-glucose-meat extract agar medium (Difco).

The coliform count was determined by using brilliant green bile agar medium (Difco), and acid-formers by the use of nutritive caseinate agar medium (Difco) to which brom-cresol purple was added as an indicator. Yeasts were determined by using potato dextrose agar medium (Difco), acidified to pH 3.5 by addition of a 10 percent tartaric acid solution.

Results of this series of tests are given in Table I.

Next, Sliced Pickles

A second set of tests was now made using fresh, sliced pickles made from cucumbers which were washed as previously described and were divided into three lots. After washing, the cucumbers were cut into ¼-in. slices and put in a sterile crock containing 4 gal. of 25-deg.-salometer brine to which had been added 1.4 oz. of tumeric and 0.6 oz. of sliced onion. The slices were left in the solution from 4 to 6 hr. and stirred every 15 min. After this treatment, they were put into pint jars to which had been added 6 fl. oz. of liquor testing 33 gr. acid and 57.3 deg. Brix. One-half teaspoonful of equal parts of mustard and celery seed was also added to each 16-oz. jar.

Then the jars were marked, placed in a steam-jacketed retort, and pasteurized at 165 deg. F. for 15 min. Temperatures were determined by fitting the lids of various jars of each batch with a rubber stopper through which a thermometer had been inserted to the center of the jar.

After pasteurization and cooling, jars were sampled to permit plating of each of the three lots on suitable nutrient media. Samples were plated at weekly intervals from the same jars, which were held at 40 deg. F. for approximately 5 months.

Chemical analysis of the sweet liquor after equilibrium had been established with the cucumber slices was: pH 3.05; salt, 2.8 percent; acetic acid, 16 gr.; Brix, 34 deg.; Bé, 18.73.

Bacteriological data are reported in Table II.

Commercial vs. Experimental

To check the experimental results with those obtained under commercial conditions, arrangements were made with a commercial pickle packer to get samples of fresh pasteurized dills packed in its factory during the fresh cucumber season.

This company's routine method of washing fresh cucumbers to make pasteurized dills was to: (1) Soak them in water for approximately 20 to 30 min., (2) wash them in a rotary vegetable washer, and (3) pass them through a pressure spray, in which they were rinsed in water at 300 psi.

For this test, the cucumbers were soaked in water to which Emulsept and Roccal, respectively, had been added at the rate of 1 oz. per 5 gal. of water used. In turn, they, too, were washed in the rotary washer and rinsed in the pressure spray to remove all traces of the germicides. The cucumbers were then packed and pasteurized in the regular manner. Controls were obtained for comparison with similar cucumbers washed without the addition of the germicides.

Solubilized spice oils were added to quart jars before filling and closing. These jars were heat-treated at 165 deg. F. for 15 min. in a continuous steam pasteurizer and then cooled to about 90 deg. F.

Chemical analysis of the brine after equilibrium had been established between it and the pickles was: pH 3.4; salt, 2.6 percent; and acetic acid, 8.0 gr.

The method for determining the bacterial plate count of the cucumbers washed with and without the germicides was the same as previously described. A bacterial analysis

TABLE I—Bacteriological Analysis of Ground Cucumbers Before and After Washing in Brine, Emulsept, and Roccal Prior to Pasteurization. (Bacteria and yeasts in thousands per ml.)

	Before Washing				Brine Wash (Control)				Emulsept Wash				Roccal Wash			
Batch	Total Count	Acid-Formers	Coli-forms	Yeasts	Total Count	Acid-Formers	Coli-forms	Yeasts	Total Count	Acid-Formers	Coli-forms	Yeasts	Total Count	Acid-Formers	Coli-forms	Yeasts
1	201,000	14,100	430.00	0.39	141,000	12,300	32.00	0.31	162,000	116,000	2.20	0.27	*	12,600	2.10	0.30
2	251,000	16,900	186.00	0.37	165,000	25,700	7.20	1.20	153,000	24,700	4.00	1.10	171,000	14,500	2.70	1.90
3	226,000	14,500	97.00	0.43	126,000	26,100	4.30	0.40	131,000	14,500	2.00	0.28	165,000	11,400	2.60	0.19
4	28,700	3,500	2.97	0.72	15,900	3,010	0.51	0.30	16,300	2,750	0.48	0.26	12,100	2,700	0.67	0.24
5	22,200	2,480	3.00	0.86	3,080	2,560	0.67	0.54	2,980	1,870	0.53	0.32	1,550	1,440	0.56	0.28

*Spreader.

TABLE II—Bacteriological Analysis of Pasteurized Fresh Sweet Sliced Pickles Made From Cucumbers Washed in Brine, Emulsept and Roccal.

(Bacteria per ml.)

	Brine Wash (Control)		Emulsept Wash		Roccal Wash	
Date 1948	Total Count	Acid-Formers	Total Count	Acid-Formers	Total Count	Acid-Formers
9–1	70	0	10	0	0	0
9–8	0	0	40	0	50	0
9–17	40	0	40	0	*	0
9–24	100	0	20	0	30	0
9–31	*	0	40	0	10	0
10–7	440	50**	100	0	170	60**
10–14	60	0	40	0	30	0
10–21	*	0	30	0	160	0
10–28	140	0	200	0	90	0
11–4	*	0	120	0	170	0
11–11	0	0	160	0	0	0
11–18	*	0	*	0	*	0
11–25	*	0	*	0	10	0
12–2	400	0	100	0	240	0
12–9	80	0	50	0	70	0
12–16	60	0	50	0	60	20**
12–23	70	30**	120	40**	40	0
12–30	100	0	110	0	160	80**
1949						
1–6	20	0	20	0	20	0
1–13	40	0	120	60**	10	0

*Spreader. **Acid-producing sporogenic bacteria.

Note: Coliforms, yeasts, and true lactic acid bacteria evidently had been completely destroyed; no colonies appeared on any of plates.

TABLE III—Bacteriological Analysis of Commercial Fresh Pasteurized Dill Pickles After Pasteurizing To Test the Effect of Washing Pickles in Water, Emulsept, and Roccal Before Canning.

(Bacteria per ml.)

	Water Wash (Control)		Emulsept Wash		Roccal Wash	
Date 1948	Total Count	Acid-Formers	Total Count	Acid-Formers	Total Count	Acid-Formers
8–20	25,000	28,000**	20,000	19,000**	156,000	730,000**
9–3	200	0	400	*	700	*
9–10	70	0	60	0	60	0
9–17	60	0	40	0	50	0
9–24	40	0	50	0	70	0
10–1	100	20**	140	0	20	0
10–8	60	0	120	40**	100	30**
10–15	120	0	*	0	*	0
10–22	0	0	10	0	20	0
10–29	100	30**	90	40**	160	60*
11–8	70	0	40	0	50	0
11–22	60	0	20	0	30	0
1949						
1–24	0	0	120	0	100	0

*Spreader. **Acid-producing sporogenic bacteria.

Note: Coliforms, yeasts, and true lactic bacteria evidently had been completely destroyed; no colonies appeared on any of plates.

of each lot was made at weekly intervals to determine its respective keeping qualities. The pickles were tested also for general appearance, flavor and crispness during the 5-month storage period. Bacterial data are given in Table III.

Counts Before and After Washing

Data in Table I show that there are many millions of bacteria on unwashed cucumbers. The total count in one instance was 251,000,000. There were few yeasts, not many coliforms, but a considerable number of acid-formers.

After the cucumbers were washed in brine, the total count was reduced approximately 50 percent. There was a considerable reduction in the coliform count, but practically no change in the total number of acid-formers and yeasts, indicating that acid-formers and yeasts persisted after washing.

These observations confirm those of Etchells and Ohmer[3] who found that cucumbers, as they come from the field, had on their surfaces millions of bacteria, for the most part spore-formers. They found yeasts and acid-forming bacteria to be present. In spite of thorough washing, yeasts and acid-forming bacteria were carried over into the brining tanks. And, even though such slices commonly remain in the tanks only a comparatively short time, relatively high populations may—quite likely do—develop during this time.

Etchells and Jones[7] obtained an even greater reduction in microbial counts after the cucumbers were washed in water—greater than those reductions recorded in Table I. The microbial load on the cucumbers used by them was much less because they doubtlessly used fresher stock or more effective washing methods. Results of Bernstein and Epstein[1] are remarkably similar to those of Etchells and Jones[7], considering that there is a lapse of about six years between the publication of the two articles.

No Change With Quaternaries

When Emulsept and Roccal, respectively, were added to the wash water at the rate of 1 oz. to 5 gal. of 30-deg.-salometer brine (Table I), there was no significant change in the microbial picture. The total count and the coliform count were reduced practically the same extent. Counts of acid-formers were somewhat more erratic but, with one or two exceptions, were not significantly different from those of the control. There is practically no change in the yeast counts as a result of any of the washings, as compared to the unwashed cucumbers. In general, the addition of the disinfectants to the wash water did not materially alter microbial counts as compared to the control.

Data in Table II show that there is no significant difference in the total counts among the three lots of fresh, sliced pickles, which had been washed according to the methods previously described and then pasteurized at 165 deg. F. for 15 min. All the coliform bacteria, the true lactic bacteria, and the yeasts evidently were killed. At least, no colonies appeared on any of the plates. The only organisms consistently resisting this pasteurizing temperature for 15 min. were gram-positive, medium-to-long rods containing central or polar spores, as shown by microscopic examination. The presence of these bacteria need cause no concern, because it has been shown by Etchells and Goresline[4] and confirmed here that there is little or no change in their numbers during the storage period.

Results of bacteriological examination of fresh pasteurized dills after pasteurization (Table III) showed that neither the addition of Emulsept nor of Roccal to the soaking water at a rate of 1 oz. to 5 gal. of water had

any influence in reducing the bacterial count of the product after pasteurization as compared to the controls which were washed in plain water. In fact, the counts after pasteurization were much higher in the case of Roccal than in the control and in those treated with Emulsept. However, after about a week's storage, all the counts were reduced to about the same level and remained at about this level. This again demonstrates the inability of these compounds to reduce the microbal content of the pickles in the concentrations used.

Not as Bright With Emulsept

An examination of the physical characteristics of the pickles approximately five months after they had been canned showed little or no difference among the ones that had been washed with the two quaternary ammonium compounds and with brine or water—with one possible exception. Pickles washed with Emulsept did not have as bright an appearance as those washed in Roccal or plain water. Without actual chemical proof, the supposition is that, since Emulsept is a detergent as well as a germicide, it doubtlessly affected the waxy coat—which gives pickles their shiny appearance, by dissolving some of the lipoidal material.

Adoption of Pasteurization

Pasteurizing pickles in the manner and on a commercial scale as practiced today is a comparatively recent development in the pickle industry. It has been used extensively only within the past 15 years or so. In 1934, Campbell[2] suggested heating the brine used in canning dills to about 170 deg. F. to destroy the activity of yeasts and bacteria.

In 1938, Etchells[3] studied the rate of heat penetration in 24-oz. jars, but he made no definite recommendations on pasteurization time and temperature for the fresh cucumber type of pickle. However, he did show that the addition of cold water (76 deg. F.) at the end of pasteurization would cool the jars sufficiently within 20 min. to avoid deterioration due to heat. In 1940, Etchells and Goresline[4] analyzed a large number of samples from experimental packs in a commercial factory and found that 160 deg. F. for 20 min., or 165 deg. F. for 15 min., was effective in reducing the microbial content so that only the more resistent bacteria survived and that even these decreased during storage.

Fabian and Switzer[5], working with the fresh pasteurized cucumber pickles during the fall of 1940, concluded that it would be necessary to pasteurize the fresh cucumber dill pickles at 165 deg. F. for 30 min. and the fresh, sweet, cucumber slices (the bread-and-butter type pickles) at 170 deg. F. for 25 min.

This work was based on excessive bacterial loads, since the jars were inoculated with soil to a greater extent than would normally be present. Furthermore, many of the companies making the bread-and-butter type pickles at that time were using this temperature.

Long-Period Tests

In 1941, Etchells and Ohmer[6] reported a bacteriological study of fresh cucumber pickles over a four-year period (1937-1940). They found that only the resistant, sporogenic bacteria survived pasteurization at 160 deg. F. for 20 min. or at 165 deg. F. for 15 min.

Later publications by Etchells and co-workers[6,7,8,10] have shown that 165 deg. F. for 15 min. is adequate and that fresh cucumber pickles as well as genuine dills so pasteurized and cooled promptly will be crisp and will keep satisfactorily.

During the 15 or more years since this type of fresh cucumber pickle has been made, hundreds of thousands of cases have been made and pasteurized at 165 deg. F. for 15 min. So this time and temperature have been well tested and are considered standard among experienced pickle men.

In the light of these facts, it is to difficult to understand the statements made by Bernstein and Epstein[1], such as: "In the absence of a positive control over the number of microorganisms to be killed during pasteurization, there has been no opportunity to standardize the heat-treatment"; also the statement: " In terms of pasteurization time at 180 deg. F., the cucumbers treated with the germicidal wash required only 15 min. as compared with 20 min. for those from the same lot washed only in tap water."

Washing a Must

Although pasteurization of pickles is of comparatively recent development as a commercial practice, washing cucumbers before processing is as old a practice as the making of pickles. The fact that the pickle-making industry has undergone a fundamenatl change in the past decade (to become a segment of the vegetable canning industry) does not minimize the importance of the cucumber-washing operation.

This change involves the application of heat to pasteurize the canned or packaged pickles made directly from fresh cucumber stock. Pickle pasteurization's significance is indicated by the fact that it was introduced shortly before World War II and the practice progressed to an all-time high in 1947, when some companies pasteurized as much as 20 percent of their total cucumber intake.

In spite of the sterilizing effect of pasteurization, fresh cucumbers used for pasteurized products must be washed thoroughly to remove clay, sand, muck, clay loam or sandy loam. This operation, important as it is in connection with the packing of all fresh produce, frequently presents a difficult mechanical and bacteriological problem, especially after heavy rains or in a generally wet season.

The approved and long-used method of washing cucumbers for fresh pack—the method which has given satisfactory results—is a three-step operation: (1) Soaking to loosen the dirt, (2) agitating to remove most of the loosened dirt, and (3) spray-washing. In the latter, the cucumbers are subjected to the action of water sprays with a jet pressure as high as 400 psi. prior to being packed into glass jars.

Problems in Packing

Mechanical removal of surface dirt is not the whole story of preparing cucumbers for canning. Jars must have a full-pack and the cucumbers must be fully covered with brine after the jar is sealed.

Since fresh cucumbers are turgid and contain a considerable amount of air in their cellular tissue, it is difficult to pack them into jars and to prevent air within them from displacing some of the brine during heating. With some of the brine lost, there is an excessive headspace, giving the jar a poor appearance. These two conditions are corrected by soaking the fresh cucumbers for about 2 hr. in cold 30-deg.-salometer brine, or for 30 min. in hot 30-deg.-salometer brine, to displace the air and to make the cucumbers pliable and easy to pack. Many plant operators use one or the other of these methods to soak and to help wash the cucumbers. Other operators use one of them, especially the hot brine method, just before the cucumbers are packed into jars.

After the cucumbers have been cleaned by washing and rinsing, they are either packed whole into quart or gallon glass jars and made into fresh pasteurized dill pickles by addition of a dill brine, or they are sliced, packed in jars, and made into a fresh, sweet, sliced cucumber pickle product by the addition of a sweet spiced liquor.

For large packs, the jars are then processed in a continuous pasteurization at 165 deg. F. for 15 min., followed by prompt cooling to below 100 deg. F. For medium and

(*Turn to page* 190)

Farm Supports Get Cleared Away

Surpluses and high prices continued in 1950 program—which leaves processor still squeezed between high costs and consumer caution

THE THREE HIGH SPOTS of the government's farm price support operation for this year are already crystal clear:

1. The support levels which the Secretary of Agriculture has some discretion in fixing will generally favor prices that are well above the lowest he could fix, if he chose.

2. The Commodity Credit Corp. kitty of $4,750,000,000 is getting so close to exhaustion that Congress will raise the agency's borrowing authority by another $1- or $2,000,000,000.

3. Crop surpluses are forcing into motion the government machinery designed to get farmers to cut back on their production of surpluses.

"Basic" Crops Stay High

On the price front, the continuation of mandatory 90-percent supports on the so-called basic crops means that: Corn will be supported around $1.40 per bushel, wheat about $1.90, and peanuts around 10c. per lb. Rice, however, will be supported higher this year than last, at around $2.00 per bushel as compared with last year's $1.78.

On dairy products, the Department's buying program will support milk at about 79 percent of the "modernized" parity—which figures out to support-prices equal to those for 1949. This 1950 program is for the marketing year ending Mar. 31, 1951.

Dairy products will be supported through two main buying programs—one supporting butterfat at 60c. per lb., the other guaranteeing national average prices to farmers for their manufacturing milk at $3.07 per 100 lb. In practice, the Department will buy carload lots of processed dairy products at these prices:

Cheddar cheese, U. S. Grade A or higher, 31c. per lb.; butter, U. S. Grade A or higher, 60c. per lb.; butter, U. S. Grade B, 58c. per lb.; nonfat dry milk solids, spray type, U.S. Extra, 12½c. per lb.; nonfat dry milk solids, roller type, U. S. Extra, 10½c. per lb.; and evaporated milk, $3.95 per case.

On eggs, the support level has been fixed at 70 percent of the new parity—or about 37c. per dozen, on the average, compared with average support levels of 47c. per dozen last year. As FI went to press, the Department had not yet announced what method it would use to maintain this price for eggs—whether through purchase of dried, frozen, or shell eggs, or all three.

Honey—a newcomer to price supports—had not had its support level fixed as FI went to press. But it appeared that both comb and honey prices during 1949 were well above the 60 percent of the parity at which the Department is required to support honey. On extracted honey, 1949 prices were around 12c. per lb., while 60 percent of parity works out around 10c. per lb. Comb honey sold for around 30c. per lb., well above 60 percent of parity.

On potatoes—the most-cited example of the contradictory aspects of price support operations—the 1950 support level has been set at around 60 percent of parity, which works out at about 96c. per bushel, compared with $1.08 during 1949.

On hogs, the only meat product that was under support during 1949, the department continued price supports through March 1950, the end of the 1949 marketing year. The price support level is $14.74 per 100 lb.

At the time of the extension of the supports on hogs, market prices were slightly above the support level, and the hope was that the support announcement of the government's commitment to buy would, by itself, keep pork prices above the support level.

The continuation of these price support operations—and others on non-food commodities such as cotton, tobacco, tung nuts—has brought CCC funds to the point where the bottom of the $4,750,000,000 support-price barrel can be seen. So Congress will be asked to kick in another $1 or $2,000,000,000 to CCC. In fact, on the first day of the new session of Congress, the chairman of the House Banking & Currency Committee, Rep. Brent Spence, announced he was sponsoring a bill to add $2,000,000,000 for price supports.

CCC officials have stated they have enough to take care of all their commitments on 1949 crops—but hint that they might have to go easy on "permissive" supports in order to make sure they have enough money to take care of the commodities on which supports are mandatory. This is all the tip-off Congress needs. Congressmen will not blink an eye in voting the farmers more money to keep farm prices up.

The new price support announcements, and the need for more money, stand out sharply against a backdrop of figures that show that farmers keep on producing surpluses, even though they actually cut back on the number of acres they plant to surplus crops.

For instance, the Department's annual summary of 1949 output showed that farmers are now geared to produce whopping crops every year, if they get any kind of break from the weather. Total output of field crops was only a notch or two below the all-time record set in 1948.

When farmers find they have to vote for controls in order to keep government-granted price supports, they take their best acres for their wheat, take better care of all crops, and thus get increased yields per acres that keep their total production up.

Controls Increase

This year, there were controls on three crops: Cotton, tobacco, and peanuts. Next year, because of the end of the export demand that took the surplus out of our mountainous post-war grain crops, there will be controls on three more: Corn, rice, and wheat.

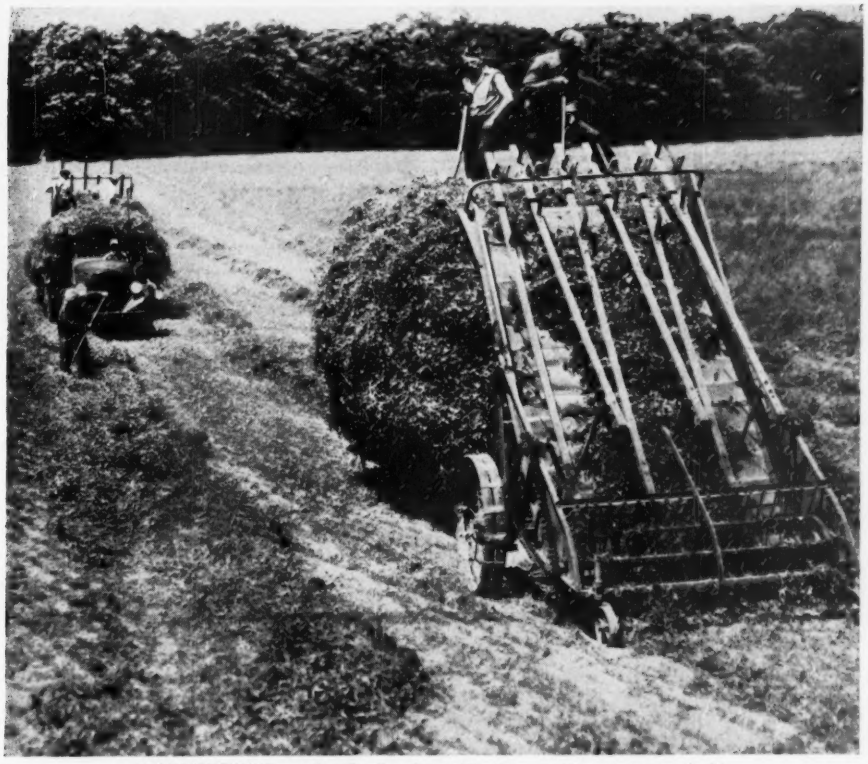
Experts, who look ahead still another year, see that with less acreage in these six crops, farmers will switch to soybeans, flaxseed, grain sorghums, or other crops that do well in their area.

Which brings on controls for those crops, too.

Congress will keep digging away at the problem, as it has done every session since the end of the war. But there'll be no real progress this year.

Instead, the farm bloc Congressmen will be politicking in and around the big issue: Secretary Brannan's political stunt for direct payments to farmers to keep farm incomes at 100 percent of parity while giving consumers lower prices on foods, and letting the taxpayer take care of the difference.

A Special Food Industries Report



HARVESTING at the Peak of quality is most important of all

Why You Freeze It That Way

Not all food plant operators know the principles upon which freezing methods are based, so quality suffers when variations pop up. But an understanding of the cogent factors examined here will go far in smoothing out the bumps

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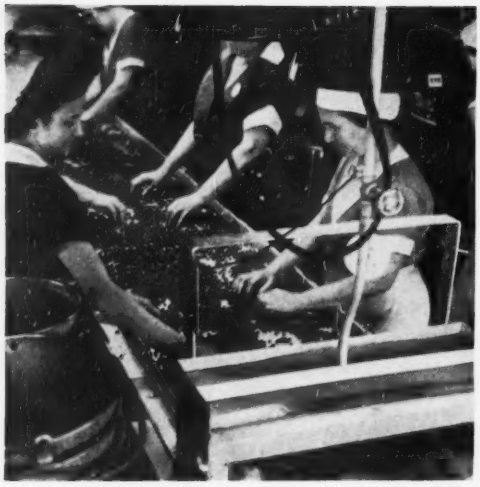
It has been my observation that lack of appreciation of certain basic principles—which had to be understood before the first successful line of commercial products could be developed—are causing much off quality in the frozen food industry today.

The reason for this is rather obvious: Despite the fact that the empirical methods by which products are processed, packaged and frozen have been well publicized by government agencies, it nevertheless appears that a large part of the industry is following such empirical methods without proper understanding of fundamental reasons.

The obvious result is that even a small departure from the manual may cause trouble, whereas with proper understanding of the principles there might be only innocuous variations, provided compensating changes in the method are also employed.

Quick Freezing

The term "quick freezing" does not exclusively refer to the fast freezing speed but includes the meaning that products are handled quickly prior to freezing. For these products must be handled expeditiously at all times from farm to freezer, as well as being frozen



Speed after harvesting is important, too . . .

. . . so is blanching to inactivate enzymes . . .

quickly. Few people realize that a tremendously wide chasm divides modern frozen foods from their cold-storage-type predecessors. Modern frozen foods grew out of the laboratory. Therefore, some of their technical problems may be difficult for the business man to grasp.

The first notice that quick freezing improves quality, as compared with the slow speeds of freezing, was reported by a Dutch scientist (Fortuyn) at the International Congress of Refrigeration at Delft, Holland, in 1912. And in 1916, during the first World War, Plank, Ehrenbaum, and Reuter published in Germany a scientific explanation of the reasons why quick freezing is superior to slow freezing—i.e., small ice crystals formed during quick freezing cause less damage to cell tissues than do large crystals formed during slow freezing, and tissues so damaged allow greater drainage of cell juices and resultant greater collapse of cell material after defrosting.

Then, in the late '20's, Birdseye showed that: 1) Animal tissues are more elastic and suffer less damage during freezing than do plant tissues; 2) freezing affects plant tissues like cooking, and it is only academic to worry about freezing speed if the vegetable is to be cooked; and, 3) for most fruits the speed of freezing necessary for best results is faster than modern methods can provide economically.

Still, this did not prove to be the whole story. During the '30's, attention was directed to the chemico-physical effects of freezing. In this field of study, Moran (England), Plank (Germany), and Woodruff (U. S. A.), expanded our knowledge of the changes that occur during freezing.

Freezing starts in the intercellular spaces, where salt concentration is at a minimum so that pure water ice crystals tend to freeze first. This results in the intercellular fluids becoming more concentrated than the fluids within the cells. Through osmosis, water is then transferred outward from the cells to the space between the cells.

Accordingly, during extremely slow freezing, the much greater opportunity for osmosis may result in partial irreversible dehydration of cell colloids. Thus, damage may be caused through the inability of cell colloids to reabsorb lost water. This water may drain during defrosting or during cooking. The result may be a dry, tasteless meat or a flavorless vegetable of low nutritive value.

But in quick freezing, the shorter time factor reduces the degree of osmosis and the cell fluids are largely frozen within the cells. This may, in reality, be likened to congealing, since the cell colloids may actually congeal rather than freeze. "Congealed" colloids retain their water, and since they do not crystallize, they protect the cells against mechanical damage. Unfortunately for those types of plant cells low in natural colloid content, such as certain fruits, commercial freezing is much too slow to obtain this protective effect.

When a fluid freezes, it expands to occupy approximately 8 percent greater volume. Thus, a considerable amount of damage occurring during freezing is caused by the bursting of individual cells, or even of whole bundles of cells. This type of damage is less in the elastic animal tissues than in the inelastic woody tissues of plants. But it is the same for quick freezing as for slow freezing once true freezing actually occurs. Hence it is quite obvious that the less water actually frozen out, the less expansion can occur. Theoretically, therefore, actual freezing should be avoided from a texture standpoint.

However, more important considerations are involved. For instance, this does not take into consideration the part played by bacteria and enzymes. Bacteria may secrete enzymes above 10 to 15 deg. F., while these and plant enzymes still active in spite of blanching, continue their activity even below 0 deg. F. Blanched green vegetables, which keep beautifully for a couple of years at temperatures of 0 to −5 deg. F., may turn to a disagreeable olive drab color in three to four months in the range of +15=+20 deg. F. Thus, the control of enzymes by low temperature storage is more important than the improvement in texture by storage at high freezing temperatures.

As to the practical effects of freezing damage, foods containing a large amount of protein, protopectin, starch, or other gel-forming or cell supporting constituents—such as meats, fish, cranberries, beans, and peas—are only slightly damaged by freezing. Fruits, usually low in viscous materials and high in moisture, are greatly affected by freezing, so that ordinary freezing speeds are important so far as most fruits are concerned. Dehydro-freezing, through preliminary concentration of cell solids, definitely improves texture of some frozen fruits.

In general, the speed of freezing necessary to prevent all damage is so rapid that, as has been said, commercial processors cannot afford to provide the required conditions. Thus, the speed of freezing becomes of secondary importance to economic considerations. In general, therefore, it is only neces-

. . . also adequate packaging materials . . .

. . . and proper freezing and storage

sary to remember that it is desirable to freeze as fast as practicable and not to expect retention of natural texture in fruits and vegetables. Freezing, however, has the signal advantage of retaining natural flavor more than any other method of preservation.

Here are some of the prime considerations and technical problems in freezing: In general, high refrigeration capacity is desirable because of the necessity for rapid cooling. For instance, inadequate cooling after blanching may reduce the vitamin content seriously; and high holding temperatures between blanching and freezing may also allow rapid growth of bacteria, which may cause loss of color and fresh flavor. Thus, quick cooling after blanching may be even more important than quick freezing. For this reason, it is important to defer packaging until the products have been reduced to 70 deg. F., even though they are to be placed in the freezer very quickly.

Meat Problems

Chief complaint about frozen meat is rancidity. This may be avoided in several ways: The packer can store the meat at very low temperatures, such as below —15 deg. F. In addition, the product can be encased in heavy foil, or other covering impervious to the transmission of moisture-vapor, thus protecting the product from desiccation and considerable oxidation during storage. The packer can also improve the quality by selecting raw material that has less tendency to become rancid.

The selection of raw material is most important in the freezing of beef. The fat of range-fed cattle usually has poor keeping quality, apparently because of the deficiency in range grass of a phospholipid having antioxidant power. When finished on corn and, to a lesser extent, on blue grass, the fat is protected by the antioxidant, and a much longer storage life of the frozen product results.

Pork and lamb are more susceptible than beef fats to oxidative rancidity, pork being particularly poor in this respect. The use of feeds containing unsaturated fats, such as fish, cottonseed and soybean oils, usually results in some direct absorption of these fats into the fat of animals. Experimentation with pork, however, has failed to indicate any major degree of improved keeping quality, regardless of feed—with the possible exception of that fat which is converted from carbohydrates. In cured meats, the proteins are involved as well as the fats, due to protein degeneration catalyzed by components of the curing mixture.

Poultry

Rancidity, freezer burn, green vent, discolored bones, and "hip joint" odor and flavor are among the troubles encountered in freezing poultry. The rancidity is usually associated with the deeper fat of older birds. Possibly, the younger birds do not have enough fat to make the rancidity problem very important. Chicken fat is far less susceptible to oxidative rancidity than the fat of turkey and game birds.

Freezer burn is caused by the irreversible dehydration of the skin around the feather follicles. Here, the tissues are destroyed, and access of air to the fat layers may promote oxidative rancidity during storage. Moreover, freezer burn allows loss of fat and moisture during cooking. It is avoided through reasonable storage periods at temperatures below —15 deg. F. or through the use of very high grade wrapping materials.

Green vents are caused by the putrefaction of intestinal contents. Quite unnecessary, they are usually associated with inadequate cooling facilities, and certainly spoil the sales appeal of the product. The hydrogen sulphide formed during decomposition is absorbed by residual hemoglobin in the tissues and causes the green color.

Discolored bone is found only in young birds, such as broilers in which the bones have not calcified sufficiently. The discoloration occurs through enzyme activity in the bone marrow, and it can be overcome by blanching the birds to inactivate the enzymes or by storage at —20 deg. F. or below. Low temperature storage is preferable, since considerable flavor is lost during the blanching. In older birds, heavier calcification of the bone hides the discolored marrow and thus such criticism is avoided.

"Hip joint" odor and flavor is the gamey characteristic that occurs in poultry that has been poorly bled and that has been exposed too long to putrefactive temperatures prior to freezing. To avoid this condition, poultry should be cooled to a temperature of 38 deg. F. or below within 4 hr. after killing. At this time, New York dressed birds can be boxed and placed in the freezing room, while birds to be eviscerated ready for the oven can be packaged for freezing. However, a large portion of the trade still allows the birds to hang for 24 hr. at 34 to 40 deg. F., eviscerating, packaging and freezing at the end of this period. This is no longer considered good practice. The new "hot-

on-the-line" evisceration permits the product to be packaged and placed in the freezer immediately so that the temperature of 38 deg. F. is reached in about 4 hr. without the necessity of re-handling.

Fish

In fish, as in cured meats, the proteins are involved as well as the fats. Even the natural body salts may catalyze protein decomposition at low temperatures. It is claimed that this chemical action is catalyzed by minute amounts of calcium and magnesium and results in the release of a group of strong flavored amino-compounds, which are well recognized in the trade as "salt-fishy".

During and since the war, antioxidants such as N.D.G.A., ascorbic acid, and ethyl gallate have been shown to be effective in preventing oxidative rancidity of fish during storage. Some of these, however, have not as yet been approved for such purposes by the Food & Drug Administration. For this reason, fatty species of fish have not been too successfully frozen for the retail trade.

Fruits

There is a tremendous variation in fruit with respect to the effect of freezing on their texture. In general, however, freezing is the best known method of preservation insofar as fruit flavor is concerned. In fact, the majority of frozen fruits are highly desired largely because of the retention of their natural flavor. Thus, most of the technical problems are concerned with the retention of the natural flavor.

Oxidation of fruit flavors usually occurs in storage, unless special precautionary measures are taken to prevent it. Many fruits, such as strawberries and oranges, contain dissolved air in their juices under natural conditions. This air must be removed prior to freezing for best results. Fruit juices have greater affinity for sugar than for dissolved air. Accordingly, selective solutions of sugar are used to replace the air where practicable. In juicy fruits, such as strawberries that have been sliced to allow access of sugar, the sugar can be supplied as dry sugar.

In fruits having a more solid texture, such as peaches, the sugar is usually applied as a heavy syrup. The strength of the syrup is very important,—in the case of peaches particularly, because peach flavor is so bland that it cannot stand much dilution. Therefore, one should add the smallest quantity of the heaviest syrup possible. The juices extracted from peaches during this process should increase the volume of the syrup by some 10 percent. Hence, about 10 percent less syrup is used than would be required to cover the peaches. Even residual air may cause a discoloration, which can only be prevented through the addition of an antioxidant, such as ascorbic acid. As a result, ascorbic acid is now used throughout the frozen peach packing industry for this purpose. The package is inverted after sealing to provide for complete contact with the fruit. An hour should be allowed for juice extraction prior to freezing. In practice, many operators add a 35-50 percent syrup and cover the product. The dilution of the flavor in this manner detracts from the quality.

Certain fruits are affected by enzyme systems in which oxygen is not necessary to cause deleterious flavor changes. Pineapple is in this class. The proteolytic enzyme, bromelin, which is very active during the ripening stages of the flesh, continues to act in the frozen materials even at very low temperatures. Enzyme action on under-ripe flesh breaks up the natural pineapple glucoside to assist in developing natural flavor and color. However, if this is not completed prior to freezing, unnatural products result, one component having a flavor resembling that of cod liver oil.

When one is uncertain as to the presence of under-ripe fruit, it is possible to protect the product by inhibiting the activity of the enzyme during storage by a chemical agent. Sodium metabisulphite has been used successfully for this purpose, provided only a slight amount of the natural glucoside is present. A similar phenomenon occurs in frozen peaches. However, the almond-like flavor that results is not nearly so objectionable and less care is necessary in selecting the fruit for freezing.

Frozen sour cherries present another type of problem. Cherry sugars are largely of the invert type, solutions of which resist crystallization. Unfortunately, cherries are also very low in pectin, so that their juices have a very low viscosity and low colloid content. The combined effect of the invert sugar and low pectin creates a condition where the juice may be more or less liquid, even at 0 deg. F. The addition of cane sugar syrups will increase the viscosity, but not enough to prevent juice leakage under commercial conditions. The addition of a minute quantity of pectin would increase the viscosity sufficiently to avoid leakage from commercial packages. However, the Food & Drug Administration requires a label notation to the effect that pectin has been added, and the majority of packers appear to avoid freezing cherries rather than to note the addition of pectin on the label.

As for vegetables, I mentioned previously that the effect of freezing on the structure of a vegetable product is similar to that which takes place in cooking. Therefore, a frozen product generally requires a shorter cooking period than the same fresh product. In the case of spinach, it has been found that fast freezing avoids some loss of juice during cooking compared with what might be lost from spinach more slowly frozen. Thus, in the case of spinach and other leafy vegetables, quick freezing is more important than in other types of vegetables.

Blanching Necessary

Blanching or scalding is of utmost importance for all frozen vegetables. This is merely a short exposure of the product in boiling water or steam in order to inactivate the enzymes that cause off-flavors at storage temperatures of 0 deg. F. and above. The enzyme catalase—probably the chief offender in this regard—fortunately can be inactivated at lower temperatures than other oxidizing enzymes, such as peroxidase and oxidase, which are of little consequence in most vegetables stored at temperatures below 0 deg. F. In the case of green beans and asparagus, however, inactivation of the latter enzymes is exceptionally important and one must resort to longer blanching periods or higher temperatures.

The actual blanching time selected depends upon several variables. Actually, catalase can be inactivated at temperatures as low as 170 deg. F. in about 20 sec. However, it is necessary to blanch peas in boiling water for 60 sec. because of poor heat penetration introduced through handling in commercial quantities. In the case of corn-on-the-cob, for instance, it is important to blanch long enough to inactivate the catalase present even in the very center of the cob, otherwise a "cobby" flavor will eventually permeate the product. Thus, for cut corn the blanching required is much less than for corn-on-the-cob.

Sanitation

Much has been written about the importance of sanitation in packing frozen foods. However, only the ordinary precautions familiar to sanitarians and most food technologists need to be observed. Briefly, all preliminary procedures possible should be carried on outside the plant proper, including washing off the dirt accumulated in the fields or from handling. Next, all trimmings and waste not to be further processed should be carried automatically by conveyor to a point outside the plant, to be picked up by truck and dumped out of range.

The food should be thoroughly

washed after trimming or other handling, and thereafter it should touch only scrupulously clean surfaces, preferably non-corrosive metal such as stainless steel. And these are "musts": Continuous washing of conveyors with sprays of city-supply water or equivalent, and scrubbing and rinsing of all tote buckets, weighing pans, and the like, after each use. Hoppers and valves of filling machines must be scrubbed and rinsed at least hourly.

In general, cleaning procedures are aimed at preventing the formation of bacteria-harboring scums and will vary from product to product. For instance, packing of cut corn requires very close attention because of the starch paste, which builds up on the equipment very rapidly. A trained cleaning crew with adequate equipment should thoroughly clean all equipment and floors between operations.

Control can be observed by taking frozen samples packed just before closing time. It has been found that for practically all fruits and vegetables, plate counts of 10,000 per gram or under can be maintained. It has also been found that contamination in excess of 500,000 per gram may cause trouble through rapid spoilage after defrosting. In spite of the fact that such control is simple and inexpensive, most commercial packs are seldom consistently under the 500,000 count.

Distribution Problems

The high first-cost of transportation and merchandising equipment presents a major obstacle in competing with canned foods on a price basis. To reduce cost, packers have tried packing a single grade of product, which naturally results in lower overall quality and consumer resistance to this quality, even though the prices are lower than the top of a line of graded products. Fluctuating consumer acceptance causes unbalanced market conditions that often prove very costly. For instance, during the past three years many low-quality frozen foods have been "dumped" on the market at one-third their original cost. No one can prove whether the low quality was due to faulty packing or faulty handling in distribution. The result is the same.

Better packers are beginning to realize three facts: 1) A sufficient number of consumers are willing to pay extra for top quality, which justifies expansion that will allow the industry to eventually lower its cost through large volume and mechanized operations; 2) the better packers are also beginning to realize that consumers will pay a high price only for top quality, and the same customers will not accept poor quality frozen foods at any price; and 3) standard and substandard peas, lima beans, and many other products, are improved by canning but not by freezing and should not be frozen even in institutional size containers.

The distribution cost of frozen foods will always be higher than for canned foods. Therefore, the extra costs for freezing should not be added to low quality raw material. Granting this truth, packers should then have as their chief objective the encouragement of farmers to grow a larger percentage of high quality crops, in order to avoid the necessity of canning so much of the lower quality—a policy that may be the key to future successful frozen food operations. Removal of low-quality, price-depressing merchandise enhances repeat business and also removes competition with inferior, low-priced products.

Perhaps the industry will continue to be small until today's large canners combine freezing and canning as a balanced food operation—a possible solution for the difficult merchandising problems that confront the industry today.

■ **"Distribution costs of frozen foods will always be higher than for canned foods. Therefore, extra costs for freezing should not be added to low quality raw material. Granting this truth, packers should than have as their chief objective the encouragement of farmers to grow a larger percentage of high quality crops, in order to avoid the necessity of canning so much of the lower quality—a policy that may be the key to future successful frozen food operations."**

As for the future, the industry may have to pin its hopes on new merchandising technics. The frozen food industry has been handicapped from the start because of inadequate transportation, storage, retail display, and home freezer equipment. Therefore, it was to be expected that poor quality would result wherever a weakly organized distribution system broke down. It was also to be expected that distribution costs would remain high until distribution channels became able to handle large commercial quantities of frozen merchandise. And it was certainly to be expected that prices would remain high until individual packer volume justified investment in labor-saving equipment, especially designed for frozen foods.

It was not to be expected, however, that after 25 yr. the frozen food industry would still see all these problems largely unsolved. But this is a fact!

For 25 yr., the industry has been telling homemakers that frozen foods are convenient, time-saving, of high quality and economical. With the single exception of fresh quality, canned foods are equally or more attractive. In the 150 yr. of the canning industry, there has been little tendency for large masses of the people to change completely from fresh to canned vegetables, even though to do so would save shopping time and would certainly minimize kitchen preparation.

Frozen foods, however, have the fresh quality that canned foods lack. They have the quality to replace not only fresh vegetables, but fresh meats, poultry, fish, fruits, delicatessen items, pies and other pastries, rolls, biscuits and other yeast goods and quick breads. This only leaves those items not usually frozen, such as tomatoes, celery, lettuce, beets, carrots, turnips, etc., and dry groceries. If all frozen food brands were as dependable as those highly advertised brands in the dry grocery field, Mrs. Consumer could do most of her food shopping by phone.

That is just what is happening in some of our large cities, now that at least a few lines of nationally advertised high-quality frozen foods are available. Availability in a few localities of complete assortments of all kinds of perishable foods, makes it possible for suburbanites to do practically all their food shopping by telephone. Although the corner grocer's wagon-delivery service has always been the homemaker's best shopping aid, his high prices makes it expedient for frugal shoppers to trade in the more distant chain stores and supermarkets when at all possible.

Recent merchandising studies concerning the home delivery of frozen foods, started at Syracuse about four years ago, plainly indicate that Mrs. Consumer hates shopping and will jump at the chance to order all her food supplies by phone when nationally advertised brands of high quality foods of all kinds become available at supermarket prices. On deliveries valued at $10 or more, the cost of delivery becomes neglible and delivery at supermarket prices becomes possible. Moreover, frozen foods are among the key items in any such merchandising plan. Hardly without exception, however, brands of frozen foods fail to meet the requirements of such a merchandising approach.

In conclusion, I would like to add that the future of frozen foods depends on a sustained national program of consumer education. Frozen foods will continue to be specialty foods, and not staple foods, until their use is taught as a general rule in secondary schools as well as in colleges. As yet, very little has been attempted.

INTO HAM (in mold, right) goes special thermocouple that plays outstanding role in getting top quality meat. It measures internal temperature of one "control" ham, thereby keeping tab on all hams in cooking vat.

They Welcome New Ideas—At a Profit

Ham packers improve boning, washing, cooking—and also their ledger balance—by refusing to "remain satisfied" with the old technics

FI STAFF

A triple goal—ever-better production of ever-better products, and at a profit—has been the constant purpose of Esskay (Wm. Schluderberg-T. J. Kurdle) at its Baltimore meat-packin plant.

The firm hasn't hesitated about putting its principle into words: "We never remain satisfied," it says, "but always aim for higher quality and improved methods of getting it." What this means in actual practice is that the company is continually testing promising new technics, meanwhile keeping a sharp eye open for the advanced equipment to put these technics to work.

The boiled-ham line particularly demonstrates how the company goes about improving its operations. Through adoption of new practices, striking advances have been made in boning, cooking and packaging.

One processing technic that has paid off well has been the conveying of hams in the boning department. By reducing the number of handlings formerly required in boning hams, this system has increased productivity about one-quarter. And at the same time, the amount of floor space previously needed has been halved.

Formerly, the workers did the boning on large tables, helping themselves to cured hams from nearby vats. After boning, they placed the hams in similar vats, later to be hauled to other workers who tied the hams before they were packed into ham molds or rectangular or pear-shaped cans.

Labor Saved on Boning Line

Now, however, handling is simplified on a conveyorized boning line that delivers cured hams directly to cutters and carrying away the boned ones. By using this system, production records have been materially improved.

This line has another plus-factor—flexibility. Depending upon the flow of hams, it can operate with a minimum of two or a maximum of eight cutters. Furthermore, it "doubles" as a beef-boning line. On it, cutters prepare the trimmings for the sausage department, also make the various corned beef cuts.

Details of Ham Boning

About 125 hams are first loaded into a metal, castered tank and brought in from the curing cellar. But before they are fed onto the line, they are first softened (so that they can be more easily cut, by running warm water into each vat, later to be drained via a valve at the vat bottom.

Next the softened hams are fed onto the 40-ft. long, 2-ft. wide slatted, stainless-steel conveyor, and they pass through an automatic ham-washing unit that consists of a slatted conveyor enclosed in a galvanized steel box

(2 ft. x 6 ft.). In the center of this box are water sprays—twelve sets, six above and six below the conveyor. Each set is spaced 2½ in. apart and is arranged to play water directly on the hams.

Hams now go to the operators stationed at 3½ x 2½ ft. tables, lateral to the conveyor. There are eight tables, four on each side of the conveyor, and each table is equipped with a removable cutting board. As the hams travel along the conveyor, each operator picks up four or five, places them on his table, and removes the aitch and leg bones, triming the hams when necessary.

Boned hams are put back on the conveyor and delivered to four operators who tie them to close openings created during boning.

Because hams vary in size, they require different size cans or ham molds. Therefore, one of the operators must also weigh and sort the hams into 8 to 10-lb., and 11 to 12-lb. groups.

Here, there are four different packs: The boiled hams are: (1) Put up in pear-shaped tins, vacuum-sealed and cooked; (2) forced into parchment paper-lined rectangular cans, with an hydraulic ham press using 550 psi., vacuum-sealed and boiled; and (3) and (4) are packaged after pressing and cooking in parchment paper-lined ham molds, one being then wrapped in cellophane, the other stuffed into a cellophane casing.

Novel Ham-Boiling Technic

An ingenious method has been adopted for boiling hams, thereby improving quality and also increasing production. Employed is an electronic precision indicator for measuring the internal temperature of the hams, together with automatic recorder-controllers for regulating the cooking-water temperature.

When hams are boiled by conventional methods in unsealed forms, they may be overcooked or undercooked. Overcooking causes the hams to lose their natural juices, flavor and texture. Undercooking, on the other hand, produces a ham that may not keep well—one that is likely to develop interior spoilage during storage.

But by applying the new rapid and accurate system of measuring internal temperature and controlling cooking-water temperature, the company is assured of safe, trouble-free production of boiled hams. In addition to improving the flavor and maintaining better uniformity in the quality of the product, significant savings in processing time result.

Making the Measurements

Key to the internal temperature technic is a rugged, waterproof thermocouple, constructed of stainless steel. It is jabbed into a ham (one in each vat of 130 to 140 hams), left there throughout processing, and removed at the end of the cook. Here is how this step fits into the procedure:

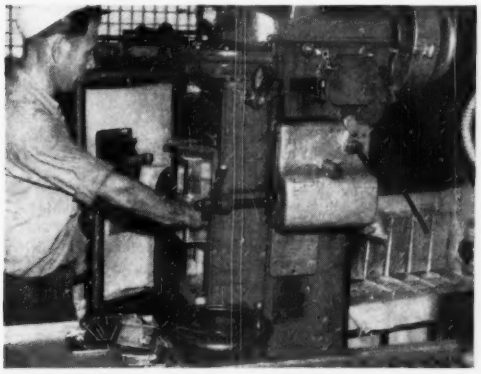
Boned hams are first pressed into metal ham molds or boiling forms.

(*Turn to page* 186)

Four Highlights in Ham-Processing Operation

CONVEYORIZED boning line is pacemaker. It supplies cured hams to cutters and carries away boned ones.

HYDRAULIC PRESS forces hams into rectangular cans. Here, meat is fed to press (left); goes into can (right).



CLOSING MACHINE vacuum-seals the cans. Next, they are transported to nearby cooking department.

OPERATOR turns selector, then reads on dial (top) temperature of "control" ham in one of 12 cooking vats.

Dairyman, Dehydrator, and Canner Attack Their Key Bacteria Problems

A TIMELY SYMPOSIUM . . . In which experts evaluate the salient bacterial questions encountered in three major fields—providing the processor with working facts on progress today and setting the sights on needs for tomorrow

PROBLEMS associated with bacteria in foods vary from one branch of the industry to another—yet there is a certain similarity, because bacteria are, in most cases, undesirable, and they present a constant challenge to the operating executives.

In the following three-man symposium, outstanding specialists range the specific problems in the following food industry branches:

- **Dairy**—where the problem is twofold: Keeping objectionable bacteria out of market milk and associated products, and cultivation of useful ones in cheeses and other cultured products.
- **Dried Foods**—where the problem is elimination of pathogens and flavor-producing organisms prior to dehydration.
- **Canning**—where the problem is attainment of maximum bacterial reduction without excessively long heating, with consequent lowering of quality.

ROBERT P. MYERS

National Dairy Research Laboratories, Inc.
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Confronting dairy bacteriologists today are problems that may be divided into two groups: Those having to do with the production of milk and milk products free from objectionable microorganisms, and those having to do with the cultivation of useful types of microorganisms.

Important in the first group is the problem of making farm sanitation so easy and convenient that dairy farmers will follow the recommended procedures. The newer cleaner-sanitizers made up with a suitable alkaline salt, wetting agent, calcium sequestering agent and germicide have partly accomplished this objective.

Several problems in the use of quaternary ammonium compounds are still unsolved, however. Germicidal effectiveness of some of them is markedly reduced by certain kinds of natural waters, particularly hard waters. The compounds are, in general, more stable than hypochlorites.

This is both an advantage and a disadvantage—an advantage when washing equipment, but a disadvantage if some of the compound remains in the milk and interferes with cheese making.

Tougher for the Farmer

In addition to mastitis and Bang's disease, the dairyman now has Q-fever to contend with, at least in some sections of the country, thus adding to his list of problems. Control of mastitis has been greatly aided through the use of penicillin. But where penicillin is widely used, enough may remain in the milk to interfere with the growth of starter organisms. Better herd management, more careful use of milking machines, and improved sanitary practices have reduced the incidence of this disease.

Brucellosis, or Bang's disease, is being brought under control through vaccination of calves and elimination of infected cows. One problem in the control of this disease has been its detection in time to remove infected cows from the herd before the infection has spread. The Brucella Ring Test* has indications of being useful for the detection of infected cows and has the advantage of being simple and inexpensive. The Q-fever organism on the other hand, is killed by proper pasteurization.

Tough for Plant Man, Too

Some interesting problems are posed by the activities of various microorganisms. For example, certain members of the genera Bacillus, Pseudomonas, and Lactobacillus, produce the enzyme phosphatase, basis of the well-known test for detecting unpasteurized products.

But other organisms, such as Buck's *Lactobacillus enzymothermophilus*, are capable of growing at 143 to 145 F. and producing phosphatase. Certain differences exist, however, between the phosphatase normally occurring in milk and that produced by these thermophilic bacteria: Milk phosphatase is completely destroyed by heating for 1½ min. at 158 F., whereas inactivation of the thermophilic bacterial phosphatases requires exposure of 5 min. at 158 F. The problem of phosphatase production in pasteurized cream by the sporeformer, *B. mesentericus*, has not been solved.

Certain strains of *Streptococcus lactis* produce an antibiotic substance that inhibits other members of this species. The action of this antibiotic, Nisin, at times, has been mistaken for bacteriophage, that attacks cheese starter organisms.

To overcome the bacteriophage problem, some plants employ multiple strain starters in the hope of always having some strains present that will be resistant to the particular phage type which is active at any given time. Others maintain a series of 6 or 7 single-strain lactic cultures, no one of which is sensitive to the phage types that attack the others.

Troublesome Microorganisms

Now let us consider some specific microorganisms which are troublesome in dairy products:

Thermophilic bacteria, usually sporeformers, grow rapidly at the customary pasteurization temperatures, but not at temperatures employed in high-temperature short-time pasteurization.

Thermoduric bacteria, micrococci and microbacteria, for the most part, grow at ordinary temperatures, but are able to resist usual pasteurization treatment. More difficulty has been encountered

* See "Quick, Cheap Ring Test Spots Brucellosis-Infected Herds," FOOD INDUSTRIES, 81, Jan., 1949—Editors.

with them when HTST pasteurization has been used than with the holding process.

Thermoduric bacteria are associated with unclean utensils and unsanitary farm practices. They are usually eliminated by improved cleaning and sanitizing practices on the farm.

Coliform bacterial contamination of pasteurized milk and other dairy products has been a problem of long standing, and interpretation of its presence has been controversial. Most workers agree that the coliform test is of no value for measuring efficiency of pasteurization—saying the phosphatase test is more reliable for this purpose.

Presence of coliform bacteria in freshly pasteurized milk or milk products indicates improper cleaning and faulty sanitizing of the equipment following the pasteurizer. From this standpoint, it is a useful test in checking plant performance. High coliform tests on milk a day or two after pasteurization indicate that the milk has not been properly refrigerated subsequent to pasteurization.

Ropy milk has been a problem for most operating plants at one time or another, and several types of bacteria are capable of producing this condition. Proper sanitation subsequent to pasteurization is usually all that is needed to control this defect, although sporeformers which survive pasteurization have been involved.

Some Produce Off-Flavors

Psychrophilic, or low temperature bacteria, are responsible for flavor defects in products held for several days. For the most part members of the genus *Pseudomonas*, these bacteria are able to grow at temperatures near the freezing point. At about 40 F. there is a considerable lag in initiating growth, but once the organisms get started they increase at a tremendous rate, often with the production of putrid, foul odors and flavors. Water supplies are frequently the source of this type of contamination.

Again, if equipment is cleaned, and all procedures of handling the product after pasteurization are properly carried out, this difficulty can usually be controlled. In a few instances, a higher pasteurization temperature has been necessary in order to eliminate the trouble.

Mold and yeast contamination of the ripened products, such as buttermilk, sour cream, cottage cheese, and butter, has always been a problem. The very nature of the equipment used in producing them, and the opportunities for growth, are largely responsible. Clean starter cultures and proper sanitization of equipment are essential to their control.

Gassy Cheddar cheese is a problem that is more serious some years than others. For example, 1949 has been a year when the gas forming anaerobes were plentiful. In Denmark and some other countries, use of potassium bromate has successfully prevented this defect. Bromate raises the redox potential to a point where the anaerobes fail to develop. But, in this country, Food & Drug officials do not look with favor on such preventive practices.

Useful Microorganisms

Problems involving the use of microorganisms are even more interesting than those concerned with their elimination. For example, it has been found possible to ferment the milk sugar of cheese whey and concentrate the more valuable nutrients (protein, milk minerals, and vitamins) for use in human foods or animal feeds. Some of the chemicals obtained are: Lactic acid, ethyl alcohol, butyl alcohol, and acetone. In our alcohol plants the primary product is the fermented whey. No loss of the more important nutrients results. In fact, the nutritive value is enhanced by the yeast present.

The oldest use of microorganisms in the dairy industry is in cheese making. Control of moisture, salt, and temperature has much to do with the types that develop in cheese. Addition of lactic cultures plays an important role in ripening. Inoculation with *Penicilium camemberti* for Camembert, *Penicilium roqueforti* for Roquefort, and *Bacterium linens* for Limburger insures development of the characteristic flavor and texture desired. Careful selection of the cultures is important.

A key problem of the cheesemaker today is to secure the flavor characteristics of raw-milk cheese when he makes pasteurized-milk cheese. The latter is being produced under controlled conditions and inoculated with tested cultures.

Spotcheck Quotes Reveal Needs

MYERS (Dairy): "The problem of phosphatase production in pasteurized cream, by the sporeformer *B mesentericus*, has not been solved."

WARREN (Dried Foods): "There is need for a relatively simple method for determining the extent of Salmonella bacteria in dried egg products."

BALL (Canning): "When we think about spoilage due to a failure to carry a process to the point required for sterilization, we must think about the question, 'Where are the surviving spores that caused the spoilage?'"

D. H. WARREN

Department Head, Quality Control, Continental Foods, Inc., Hoboken, N. J.

In considering the importance of bacteria in dry food products, two factors are paramount: Bacteria of public health significance—pathogens—must not be present in, or gain access to, the product before or during processing; and the number of bacteria, yeasts and molds present should be reasonably low, to avoid deterioration in flavor, color, acceptability, and other qualities of the finished product.

Our company distributes several dry food specialties, particularly soup mixes and a dessert product, and employs in their manufacture spices, seasonings, dry milk, powdered egg, sugars and dehydrated vegetables. For this reason, my comments will be based largely on our experience in handling these particular food substances.

Specifications for Purchased Products

For the purpose of insuring good sanitation practices in the processing plants, we have set up the following specifications for dried vegetables: (1) Maximum bacteria plate count of 25,000 per g., except onion flakes and onion powder, which have a maximum of 100,000 per g.; (2) *E. coli* organisms absent in 1/100 g. amounts of the material examined; and (3) a maximum total yeast and mold count of 50 per g.

While, in general, most shipments of dried vegetables meet these specifications, occasionally we find higher bacterial counts. Some lots of celery have shown variations of 15,000 to 340,000 per g. Considerable variations have also been noted in several samplings within a single shipment of onion powder, in which the bacteria count varied from 60,000 to 1,200,000 per g. Such variations are probably due to uneven distribution of bacteria on vegetables.

Examination of dried vegetables will generally show negative findings for *E. coli* contamination in 1/100 g. amounts. Since these organisms are killed during the proper blanching of vegetables, their presence in the finished product is indicative of contamination during final processing and handling.

Yeast and mold counts on dried vegetables have shown a range of zero to 35 per g.

We have found bacteria counts of black pepper and paprika ranging from 280,000 to 4,500,000 per g. and of turmeric, from 60,000 to 2,000,000

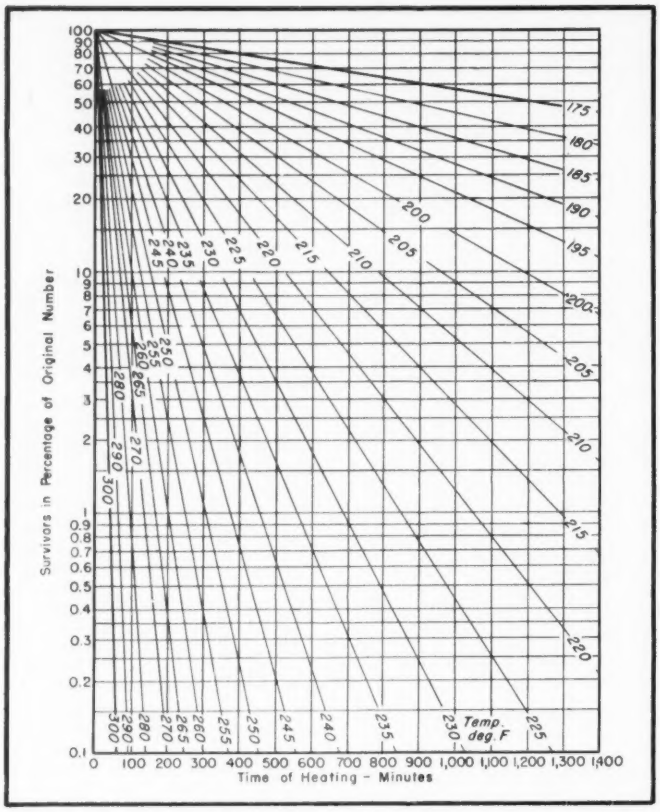

FIG. 1. Survivor curves indicate time required to kill spores present in canned foods. Plotted for different temperatures, they are used in calculating amount of lethal heat necessary for safe processing.

per g. Spice extractives, consisting of oleoresins of a spice in a soluble carrier such as salt or dextrose, contain only small numbers of bacteria. Counts are usually under 1,000 per g.

Thermophiles Commonly Present

In dry food products thermophilic bacteria are not particularly significant from a health standpoint. They are commonly found in sugars and survive, in spore form, even under certain sterilizing processes. We have found that thermophilic cultures, isolated from cooked soup prepared from stored dry mixes, show optimal growth activity at 122 to 131 F., and the condition is not unusual.

Heat-treated sugars have been shown to contain equally viable thermophiles. Our observations fail to demonstrate any growth of such organisms in dry soup mixes or an injury to quality traceable to their presence.

Milk of good quality, if properly processed by spray-drying or drum-drying, generally has a low bacterial population. The American Dry Milk Institute has established grading specifications for spray-dried nonfat milk solids. For "Extra Grade" powder, such as is used by our company, they require, among other characteristics, a maximum bacterial count of 30,000 per g. and a maximum moisture of 2.75 percent.

Most of the interest in the bacteria found in dried egg products has been focused on spray-dried whole egg powder. Presence of a group of bacteria known as Salmonella has been the cause of considerable concern from a public health viewpoint in this country and in Great Britain.

Evidence, resulting from studies by American and British investigators, strongly suggests that bacteria of the Salmonella group found in dried eggs are responsible for a gastro-enteric type of food poisoning. While the evidence is still a subject of considerable controversy, it is a fact that Salmonella has been repeatedly found in spray-dried egg powder and that their presence should be regarded as a potential health hazard.

Methods for Bacterial Determinations

In examining dehydrated vegetables, spices, and seasonings for total bacterial count, they are plated in serial dilutions in dextrose tryptone agar and in nutrient agar at 37 deg. C. for 48 hr. In the case of vegetables, approximately 20 percent higher counts resulted with dextrose tryptone agar. *E. coli* is determined by the use of brilliant green lactose bile broth, followed by streaking on eosin methylene blue agar. Yeast and mold counts are obtained by plating in potato dextrose agar, acidified to pH 3.5. Incubation is at 25 deg. C. for four days.

Examination of sugar, milk powder and egg yolk powder follows the procedures outlined for estimating bacterial populations in *Standard Methods for the Examination of Dairy Products.*

There is need for a relatively simple method for determining the extent of Salmonella bacteria in dried egg products. The present method using enrichment in selenite broth, plating in several differential media, and biochemical tests, requires agglutination reactions with rabbit serum of known Salmonella types.

Goresline has described these procedures, which have been adopted in our laboratory for the examination of dried egg yolk, except that we do not carry out the rabbit serum typing. It is generally accepted that if the cultures have followed the typical pattern for Salmonella through all the previous tests, identification may be considered positive.

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It has long been known that food, when put into cans, does at times contain a high concentration of spores of bacteria, which, if not destroyed, would cause the food to spoil.

On the assumption that this condition might exist at any time, unknown to the canner, it was formerly customary, in establishing thermal death time curves for use in evaluating processes, to determine the time necessary to destroy spores in such concentrations as were thought to be the maximum that would ever occur.

It was known that the time required to kill spores was longer when many were present than when the number was small. But the amount of this difference in time was not considered of much importance. Therefore, little attention was given to this question.

By 1940, however, the idea began to grow that something ought to be

learned about the magnitude of the effect which variation in number of spores in the substrate has upon the time necessary to destroy them. And hence procedures began to appear whereby the rate of destruction of spores during continuous heating could be determined. An apparatus for this purpose was designed by Williams, Merrill, and Cameron of the National Canners Association.

Survivor Curve Developed

Data on rate of destruction of spores are usually presented in curves showing the relationship between time and the number of survivors—expressed either in terms of actual numbers or in terms of percentage of the original number. A system of such curves, applying to a hypothetical microorganism, plotted to an ordinate scale which is expressed in percentage of survivors compared to the original number, is illustrated in Fig. 1.

These curves tell us that, on the average, the bacterial spores in each unit volume, are affected to an equal extent by a given quantity of lethal heat. And our reasoning has been that, since this is a fact, bacterial spores are most likely to survive in the unit volume which receives the smallest amount of lethal heat. This unit volume is located either at the center of the container or a short distance below the center, depending upon the nature of the product. Process calculation procedures have been based upon this principle.

New Method Predicts Destruction

Since complete destruction of spores is, theoretically, never assured, the new viewpoint is necessarily concerned with incomplete destruction. Certainly, when we think about spoilage due to a failure to carry a process to the point required for sterilization, we must think about the question, "Where are the surviving spores that caused the spoilage?"

The evolution which is now in progress, in the mathematical procedure for determining safe processes for canned food, is bringing the survivor curve into use as the basis for calculating the amount of lethal heat required to produce a safe condition. In addition to the rate of destruction data, obtained in the laboratory, the original bacterial state of the food is also used in the calculations.

In other words, the new element in this application lies in the mathematical treatment of the results of rate-of-destruction tests to establish a basis for predicting the destruction of bacterial cells in an actual process.

It is true that the average reduction in number of viable spores per unit volume—say, 0.1 ml.—is in accordance with the survivor curve. But the probability of spoilage depends primarily upon the total number of survivors within a container rather than upon the number in any unit volume. The up-to-date method of calculating sterilizing processes consists of calculating the total number of survivors within the container.

If all unit volumes obtained the same heat treatment, the average number of survivors per unit volume would be as indicated by the survivor curve. When different unit volumes are subjected to different heat treatments, the average number of survivors in all unit volumes which are subjected to a given heat treatment is that shown by the survivor curve, applied to the given unit volume, for that heat treatment.

There are groups of unit volumes, each comprising a layer all parts of which receive lethal heat to give the same F-value**. Each such group may be called an "iso-F-value group." The arrangement of layers, or regions, within a container is illustrated symbolically in Fig. 2.

The simplest way to calculate the total survivors in a container appears to be to calculate the number in each iso-F-value region and then find the sum of the numbers for all the regions in the container.

A procedure has been developed for calculating either the number of surviving spores in a container following a given process, or the length of time required to reduce the viable spores to a given number. It seems to be a sound hypothesis that the condition of commercial sterility may be described as that of a given very low number of surviving spores—such, for example, as 1 spore in each 1,000,000 containers. It is apparent that the time required to attain this condition will depend upon the number of viable spores in the food at the beginning of the process.

In terms of the indications of the percent-survivor curves, a smaller percentage of survivors must be attained when a greater number of spores is originally in the food than when a less number is present. To attain a lower percentage of survivors requires a longer time. And the lower the process temperature, the greater the time required. This is clearly shown in Fig. 1.

Controlled Sanitation Assists

This fact clearly shows that a reduced process is justified when the amount of bacterial contamination originally present in the food is low. The practical significance of this statement lies in the fact that the shorter the sterilizing process at a given temperature, the higher the quality of the finished product—as a rule.

Controlled-sanitation measures can be used to insure that the contamination of food with bacterial spores will be held within certain limits, and thus make a process of comparatively low lethal value safe for the product. A canner who does not find it possible to practice controlled sanitation is, therefore, at a disadvantage as compared to one who follows such practice.

This principle of effecting an improvement in quality of a finished canned product through the use of sanitation steps, to make possible use of a shorter sterilizing process, is being applied in a limited way by some progressive canners. To the best of the writer's knowledge, however, none takes the greatest possible advantage of its application, because a state of control has not been attained in which the canner may feel sure that the number of spores in the food, when sealed in the container, is down to the number which would be destroyed by the process he would like to use.

The symposium presented above was collated from three papers read before the New York Section of the IFT, Nov. 16, 1949. The papers were: "Some Microbiological Problems In the Dairy Industry" (Myers); "Bacteriological Problems In Some Dried Foods" (Warren); and "Controlled Sanitation Aids Sterilization of Canned Foods" (Ball).

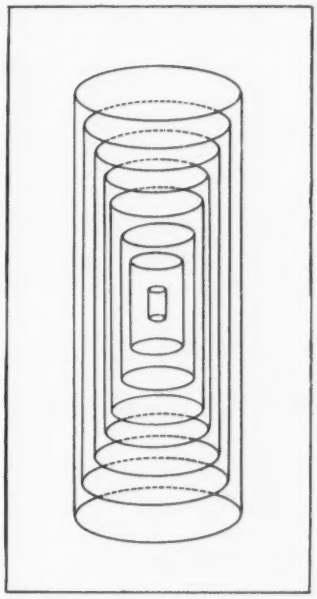
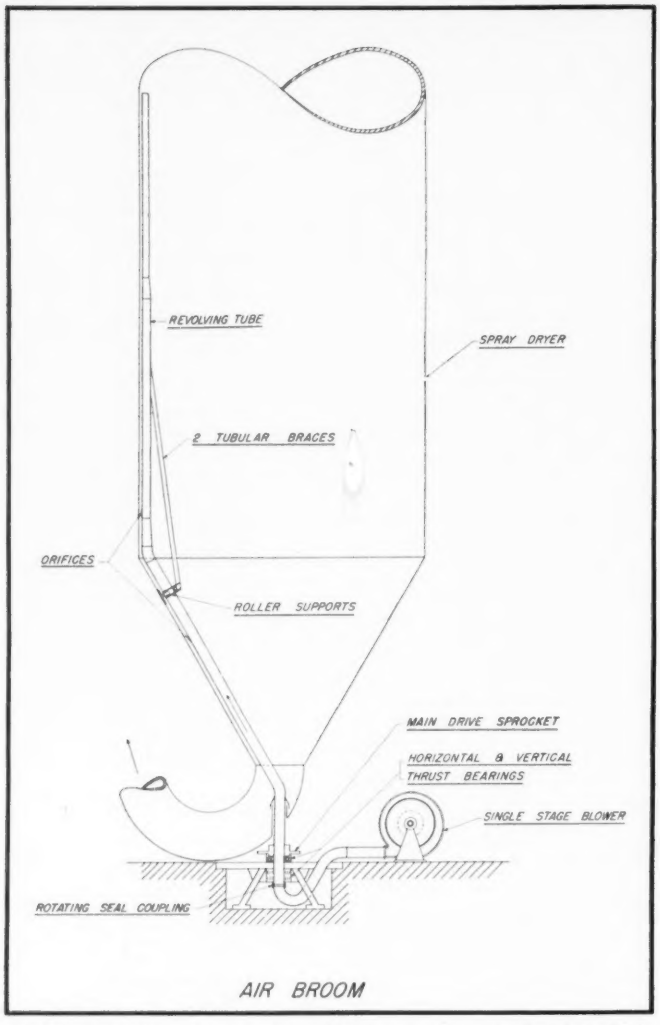


FIG. 2. Graphical sketch shows how spore-killing heat penetrates food in a container "layer-wise."

** The strength of a process, expressed in terms of time of heating at 250 deg. F. required to give lethal effect equal to that of the process, is called the F-value of the process.



"BROOM" TUBE revolves slowly within dryer and constantly ejects high-pressure air against unit's inner walls. Thus, food particles are kept in motion and as a result pound-for-pound yield is increased.

Novel Air Sweeper Brings New Drying Efficiency

Preventing the building-up of deposits, it enables successful spray dehydration of more foods

J. T. SETTELMEYER
General Foods Corp., New York City

A new unit now makes possible the practical spray drying of a number of foods hitherto difficult to dehydrate on a commercial-yield basis. And it has proved particularly suitable for handling materials high in sugars and fat.

Successfully developed and tested on an experimental basis by General Foods Corp., the new procedure overcomes one of the most troublesome operating problems encountered in spray drying—deposition of product on the inside walls of the dryer.*

Employed is a special apparatus known as the Air Broom (see drawing). In its experimental form, this equipment consists essentially of a slowly-revolving tube (motor driven) which travels within a few inches of the walls and bottom of the dryer. An external blower unit provides the high-pressure air which is discharged from suitably located orifices directed at the dryer surfaces.

In this test version the orifices consist of ¼-in. dia. holes spaced on 1½-in. centers. These orifices have been positioned as close as possible to the dryer walls.

Tubular Framing Used

It was found that cable or structural steel should not be used as a part of the supporting structure, due to the heavy product accumulation on such members. Hence, the supporting framework employed here consists of tubular members, which are cooled and cleaned by air supplied from the main tube. Product must be kept from all supporting rollers and structural work by means of air jets.

For design purposes, the air-quantity requirements for a unit in an average-sized commercial dryer have been found to be roughly 10 percent by weight of the total air handled in the dryer proper. Air at various conditions can be employed, but air at unconditioned room temperature was found to suffice for most products treated in the original experimental unit.

Later, other models were built. Initial pressure at the lower portion of one Broom 56 ft. long was in the order of 25-in. water gage. However, it was found in another that 15-in. water gage at orifices within 1½ in. of the dryer walls gave excellent results. In one case, high initial pressure was employed to overcome pressure drop incident to the high velocities required to hold tube size at a desirable minimum.

The effect of the Broom on capacity did not conform to theoretical calculations, although on the basis of 10 percent, cited above, it rendered extremely conservative results. Observations indicate that inlet temperature in the dryer drops to within 10–15 percent of its final outlet temperature within 4 ft. of the atomizing device.

The Broom functions at the walls and bottom of the dryer. Hence, the

* See also, Seltzer & Settelmeyer, "Spray Drying in the Food Industry", Advances in Food Research.—Vol. II, N. Y. Academic Press 1949.

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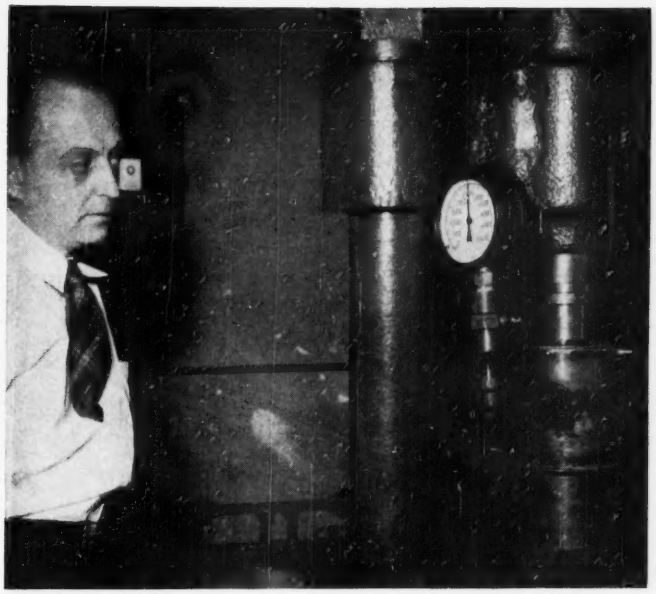

CLOSE-UP of motor-driven hydraulic press used in the studies. Egg white was subjected to pressures up to 5,000 psi. for 5 min. period at 25 deg. C. In this manner, effect of pressure alone was isolated for the purposes of the study.

Brief of the Findings

Liquid egg white was shown to be undamaged by exposure to a static pressure of 5,000 psi.—but greatly altered properties resulted with homogenization at equivalent, or less, pressure.

It was thus concluded that the damages resulted from disruptive and shear stress forces rather than from pressure. Homogenizing more than doubled the whipping times, reduced the viscosities to less than half, and caused pronounced changes in the properties of the ovomucin fraction. In addition, cakes prepared with freshly homogenized samples had appreciably reduced volumes.

During storage of the homogenized material at 2 deg. C. for 3 to 7 days, a reversion of the damaged properties responsible for the reduced cake volumes apparently occurred. Thus, cakes prepared from the stored white gave progressively increased volumes until they equaled those of the controls.

Shear—Not Pressure—Harms Egg White

Tests show disruptive forces in homogenization alter characteristics of baking ingredient. Static pressure—even to 5,000 psi.—is exonerated

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Pressure in a processing system does not damage egg white. But mechanical, or shear-stress, forces may cause serious injury.

These facts were revealed by recent investigations made at the Western Regional Research Laboratory, Albany, Calif.

The results direct attention to a reevaluation of plant practice and of equipment design. It appears that equipment should operate with less mechanical disruption and/or at reduced shear-force values and not merely at low pressures.

Although high pressures might intensify certain mechanical stresses, pressure for pumping, mixing, cutting, screening and spraying, may be employed if the forces (mechanical and/or shear) to which the egg white is exposed are not great.

Present plant practice in the processing of liquid egg white avoids subjecting it to pressure. This practice is the result of accumulated commercial experience in which liquid egg white, exposed to high pressure in homogenizing, milling, etc., did not always whip or function properly in angel food cakes.

This avoidance of pressure is also consistent with the observations that ovalbumin solutions are coagulated by high pressure.[9,10,12] Although the pressures encountered in the processing of egg white are much lower than those required to cause gross changes in ovalbumin solutions, it is not unreasonable to expect partial changes of egg white traits at these lower pressures.

Despite the importance of this subject, there is little information either as to the causative agent of such damages to egg white or as to the characteristics of the damaged material. Only recently it has been reported that the mild cutting and homogenizing action of a Waring Blendor causes no damage, whereas homogenization at 4,000 psi. causes appreciable damage.[5]

It became apparent that a quantitative description of the alterations caused by homogenization, as well as knowledge of the causes of the damages, is essential for the development of more efficient processing equipment and procedures. In addition, the quantitative descriptions of the properties of the damaged materials might be useful in developing methods for estimating the degree of damage caused by homogenization, also useful in determining utilization of material unavoidably damaged.

The present investigation was undertaken to determine quantitatively

certain properties of egg white after subjection to homogenization and to differentiate between the various possible causative agents.

Physical-Chemical Changes Noted

All homogenized samples showed a decrease in relative viscosity. Most of the decrease occurred at the lower pressures, and the absolute decreases were consistent in the three separate experiments (see Fig. 2). In the bomb-treated samples, no viscosity changes were observed.

rthan viscosity of the homogenized made "mucin-free" by the Balls and Hoover[3] technic and concentrated by lyophilization to original volume, and also samples of white freed of mucin by pH adjustment to 5.0, had relative viscosities of 1.7 to 2.0, slightly lower than the viscosities of the homogenized samples.

Also exhibited in the homogenize samples was a change in the isolation characteristics of the ovomucin fraction. In all experiments, control and bomb-treated samples gave a typical stringy coagulum when treated by the Balls and Hoover[3] technic for the isolation of ovomucin; the homogenized samples merely became opalescent.

Either overnight storage in a refrigerator or high-speed centrifugation was necessary to separate a gummy precipitate from these samples.

What they did . . .

Eggs used were obtained on the local wholesale market —top quality in Experiments I and III, lower-quality in Experiment II. They were broken and separated with utmost care to prevent any yolk from contaminating the white. To obtain homogeneous samples, the white was mechanically thinned in a Waring Blendor.* And 750 to 800 ml. of white were placed in the blendor bowl. By means of a variable voltage transformer set at 60v., the unit was operated at reduced speed.

Then, by submerging a 250 ml. Erlenmeyer flask about ½ in. into the liquid, mixing and cutting were carried out without whipping air into the white. Blended for 30 sec., the white gave a homogeneous, smoothly pouring liquid that exhibited no tendency to separate into thick and thin portions when centrifuged or when poured through several layers of cheesecloth. Control experiments showed that this treatment did not alter any whipping properties or angel-cake function of the white and that even much longer blending times could be employed under these conditions (see Table I).

Blended white was then passed through several layers of cheesecloth to remove most of the chalazae. In any one experiment, all the blended material was pooled, and samples, including a control, were drawn from this lot. Temperatures of pooled whites ranged from 12 to 15 C.

Egg white was homogenized in a Manton-Gaulin high-pressure pump with a single-stage homogenizer valve. The homogenizer outlet was equipped with a goose-neck that prevented the filled pump and homogenizer unit from draining when idle, thus insuring that the low-pressure side (outlet) remained filled with egg white during operation. This arrangement avoided gas-liquid interface denaturation. Maximum temperature rise in the homogenizer at the highest pressure (4,600 psi.) was 9 deg. C.

In operation, the white was first allowed to flow through the pump with the homogenizer orifice open until all air was displaced. The pump was then started and the homogenizer orifice rapidly closed until the desired pressure was obtained, at which time sample collection was begun. When sufficient sample was collected at the first pressure, the orifice was closed further and the next sample was collected at a higher pressure. Material collected during pressure adjustments was discarded. All samples were stored at 2 deg. C. or, for the freezing experiments, placed in pint cans, frozen and stored at —18 or —34 deg. C.

Experiments designed to determine the effects of pressure in the range obtained during homogenization were performed in a pressure bomb. Samples of egg white were subjected to a pressure of 5,000 psi. for 5 min. at 25 deg. C in a piston-type bomb operated by a motor-driven Watson-Stillman hydraulic press. This was a pressure exposure 10 to 20 times longer than that encountered in the homogenizer.

Three separate homogenization experiments were performed approximately six weeks apart. Homogenization pressures employed were as follows: Experiment I, 500, 2,000, and 4,600 psi.; Experiment II, 1,000 and 4,600 psi.; and Experiment III, 4,600 psi. Control samples from Experiments I and II were under pressure in the bomb.

Nitrogen determinations were made by the micro-kjeldahl method (according to Clark[8]). Relative viscosities were determined in a size-100 Ostwald pipette at 20 deg. C., and pH values were obtained with a Beckman Model G meter. Ovomucin estimations were made by the technic of Balls and Hoover[3], with the exception that the precipitate was not washed.

Down to Details

Whipping tests were performed with a Model E Hamilton-Beach electric mixer, operated at 3,500 rpm. free running speed (determined with a stroboscope). From preliminary tests, this speed gave foams of lower specific gravity and greater stability than any lower speed. Modified whipping bowls were made from Pyrex evaporating dishes (No. 3180) 150 mm. by 80 mm., with a female 10/30 standard taper joint attached near the bottom and parallel to it. The outlet was supplied with a plug.

After a whip was made, each bowl could be removed, tipped, and the plug removed to collect drainage. The bowl platform was rotated by a friction drive made from a slow-speed gear motor and a large rubber stopper. In performing a whipping test, a 50g. sample of white (48 ml.) was placed in the bowl and whipped for a definite time. A soft rubber spatula held against the side of the bowl partially directed foam back into the blades.

When whipping was completed, drainage measurements were started and followed for 30 min. Relative stabilities of foams were obtained by plotting the ml. of drainage against time and expressing the stability as the time in minutes for 2 percent (0.95 ml.) of the original liquid volume to appear as drip (see Fig. 1). This differs from other stability measurements 2, 4, 7, 11, 13, 16 in that it is essentially a measure of the lag period before a foam begins to break down, or drip, at a constant rate. To estimate foam volume, a duplicate whip was made and the specific gravity was determined by weighing a portion in a level-filled, tared, crystallizing dish of known volume.

Angel food cakes were made with the following formula: Flour 22.5g., sugar 62.5g., egg white 61.0g., salt 0.3g., and cream of tartar 0.9g.

Egg white was whipped in a Hobart mixer (Model K-4-B) at Setting 10 for 10 sec., then the salt and cream of tartar were added. Beating was continued to a specific gravity of approximately 0.1 (visually to an opaque shiny stage). Three-quarters of the sugar was then added in three equal lots at 4-sec. intervals. And after the last sugar addition, beating of the meringue was continued for 6 sec.

A sifted mixture of flour and remaining sugar was then added in four equal lots and folded with ten strokes of a wire whip after each addition. Specific gravity of the foam, meringue, and batter was determined by weighing a portion in a level-filled, tared container of known volume.

The batter (120g.) was weighed into a tared, ungreased, rectangular pan of known volume and baked 22 min. at 175 deg. C. in a standard-sized reel-type test baking oven. The baked cake was allowed to cool at least 1 hr. in an inverted position before the volume was determined by the rape-seed displacement method.

* Mention of this and other products and equipment does not imply Department of Agriculture endorsement or recommendation over other products of similar nature not mentioned.

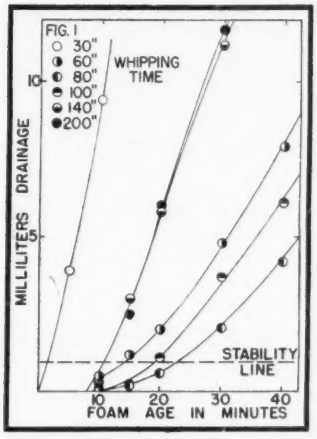
Both volume of precipitate obtained and nitrogen removed from the egg white indicated that approximately the same quantity of ovomucin fraction was present in all samples. Thus, while the physical state of the protein appears to have been altered, its amount was not reduced. Moreover, no changes in pH were noted.

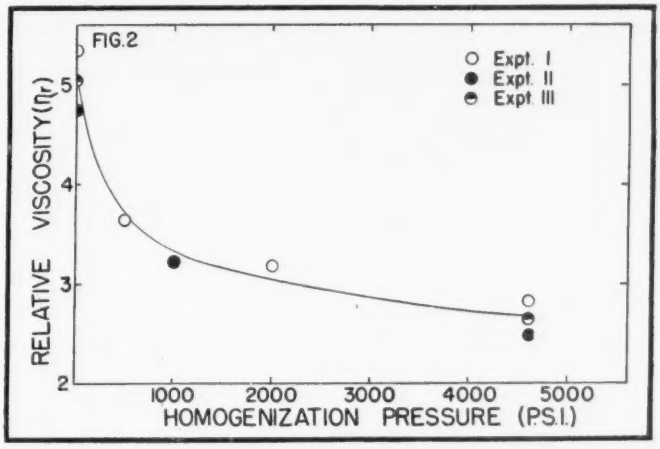
As the homogenization pressure was increased, longer whipping times were required to obtain specific gravities approaching or equaling those of the control samples. For example, the time required to whip whites to a specific gravity of approximately 0.10 was 50 sec. for the controls, 70 sec. for the whites homogenized at 1,000 psi., and 100 to 160 sec. for those homogenized at 4,500 psi.

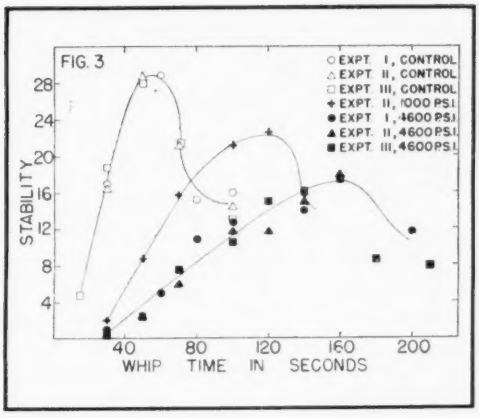
Homogenized whites also required longer whipping than the control whites to reach their greatest stability, and never equaled that of the controls (Fig. 3). Bomb-treated samples gave results similar or identical to those of the controls.

Cakes baked immediately after processing of the whites showed decreased values with increased homogenization pressure. Fig. 4 contains only the data from Experiment III; however, the other experiments gave similar results with cake volume decrease roughly proportional to pressure of homogenization. Cake volumes were reduced by

. . . and what they learned







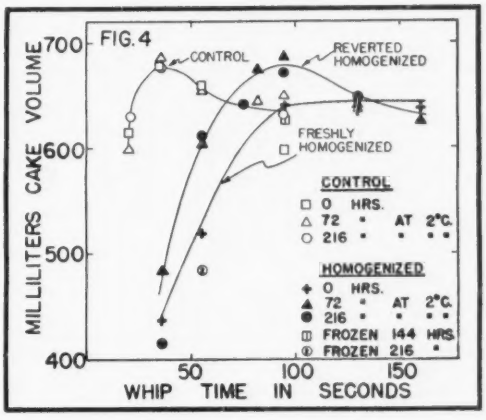


TABLE I—Effect of Blending on Properties of Egg White 750-800 ml. white prepared in Waring Blendor, operated at reduced speed, with precautions to avoid foaming.

Blending Time	Relative Viscosity	Cake Foam Whipping Time (Sec.)	Cake Volume (Ml.)
20 Sec.	4.82	36	688
40 Sec.	4.63	46	683
60 Sec.	4.43	53	688
80 Sec.	4.35	55	684

TABLE II—Bacteria Counts on Homogenized Egg White Stored at 2 Deg. C. Medium: Tryptone glucose extract agar, incubated at 32 deg. C. for 72 hr.

Storage Time	Bacteria Counts (Experiment I)		
	Control	500 Psi.	4,600 Psi.
0 Days	250	3,800	5,100
3 Days	50	2,800	2,800
5 Days	450	2,100	2,200
8 Days	30	3,400	25,000

homogenization at 4,600 psi. in the following manner: Experiment I, 700 to 590 ml.; Experiment II, 655 to 630 ml.; and Experiment III, 680 to 635 ml. Pressure bomb-treated samples gave cakes similar to controls.

As homogenization pressure was increased, additional time was required to whip the cake meringues to a given specific gravity. Although meringue and batter specific gravities equivalent to those of control eggs could be obtained with prolonged whipping of the homogenized whites, cake volumes of the latter samples were lower than those of control whites, irrespective of whipping time.

Cake Volumes Varied

An unexpected, progressive increase in volume was found in cakes made from homogenized whites held at 2 deg. C. The rate of reversion as measured by increase in cake volume varied in the different experiments. But after three to seven days' holding, the volume of all homogenized samples equaled that of the control samples. And, with longer holding after the samples had reverted, cake volumes remained equal to those of the control samples.

Fig. 4 is a plot of the cake volumes vs. whipping times for Experiment III for the controls, freshly homogenized white, and aliquots of both held for six days at 2 deg. C. The time required to whip the cake meringues of the homogenized samples to a given specific gravity decreased during holding at 2 deg. C. (from 130 to 90 sec. in Experiment III) but did not approach the 36-sec. whip required for the control samples. No changes in cake volume or whipping time of the control samples were found.

The remaining properties of the egg white that showed damage following homogenization did not show any reversion after holding under the above conditions. There was no pronounced increase in the bacteria count of samples held at 2 deg. C. during the time in which reversion occurred (see Table 2).

Freezing of the homogenized samples immediately after processing prevented reversion during the time the samples were frozen but not during the period following thawing. In Experiment III, reversion did not occur in samples held frozen for six to nine days after homogenization (see Fig. 4). It also did not occur in homogenized samples frozen at −34 deg. C and stored at −18 deg. C. for two months, but it did occur after holding of the thawed samples. For example, the thawed samples gave cake volumes of 635, 645, 655, 660, and 675 ml. after holding at 2 deg. C. for 0, 24, 48, 96, and 168 hr., respectively.

Absence of any detectable changes in the samples exposed to pressures of 5,000 psi. in the bomb eliminated pressure, *per se*, as the causative agent of the observed damages. The demonstration that the damage was not caused by pressure leaves only four other probable causative agents: Heat, gas-liquid surface denaturation of labile proteins, mechanical disruption of physical structures, and liquid-liquid or liquid-metal shear effects on the egg white.

The first two possibilities were obviated by the conditions of homogenization. The last two—mechanical disruption and shearing stress—are therefore the remaining possibilities. And the damages encountered at different pressures of homogenization are merely reflections of different degrees of mechanical disruption or shearing stress.

Observed damages may be classified as two types. The first type, which is irreversible, causes the increased whipping times, the reductions in viscosity, and the changes in the ovomucin fraction. The other, which is reversible, causes the initial reduction in cake volume, which characteristic reverts on storage of the damaged white.

Obviously, the first damage is indirectly related to cake volume, since cakes prepared from homogenized white made at the normal whipping time for the control yielded very low volumes for either freshly homogenized or stored homogenized samples (see Fig. 4).

The first damage can be explained on the basis of mechanical disruption of a physical structure by cutting actions, shear stresses, or both. The lowered viscosity and changed precipitability and characteristics of the ovomucin fraction indicated that physical alteration of some gross structure had occurred. Hoover[16] noted such changes with a laboratory hand homogenizer, but he apparently obtained less extensive effects.

Ovomucin, which reputedly exists in fresh egg white as a physical network of interlocked fibers,[1,9,14,15,17] can thus probably be disrupted to varying degrees. The blending and cutting action of a Waring Blendor disrupts the gelatinous structure of thick egg white (for which ovomucin is supposedly responsible) without greatly altering its functional behavior (Table I). However, greater disruption and apparently complete breakdown of the fibrous structure occurs by homogenization treatment as employed in this study.

The second damage—that responsible for lowered cake volumes and reverting on storage—may be caused by some less evident change, such as disaggregation or deformation of protein molecules, with restoration occurring during storage. It appears that this damage might be better explained as caused by the shear stresses involved in forcing the white through an orifice than by mechanical disruption of a physical structure. The fact that normal cake volumes are obtained after storage indicates that the change on storage is a reversion and not a further change.

It is recognized that the actual performance of egg white in making cakes, meringues, etc., is the only known way of correctly evaluating a particular lot of egg white for a particular purpose.[18] However, it is necessary to recognize that cake making is an empirical art and that the formulas and technics employed in the preparation of cakes for this study may not have been optimal for detecting the incurred damages. The importance of cake preparations, and the possible inaccuracies when other methods, such as those involving different whipping times, are employed as criteria of cake quality, were amply demonstrated with the reverted homogenized samples, which gave satisfactory cakes but had greatly prolonged whipping times.

Acknowledgment

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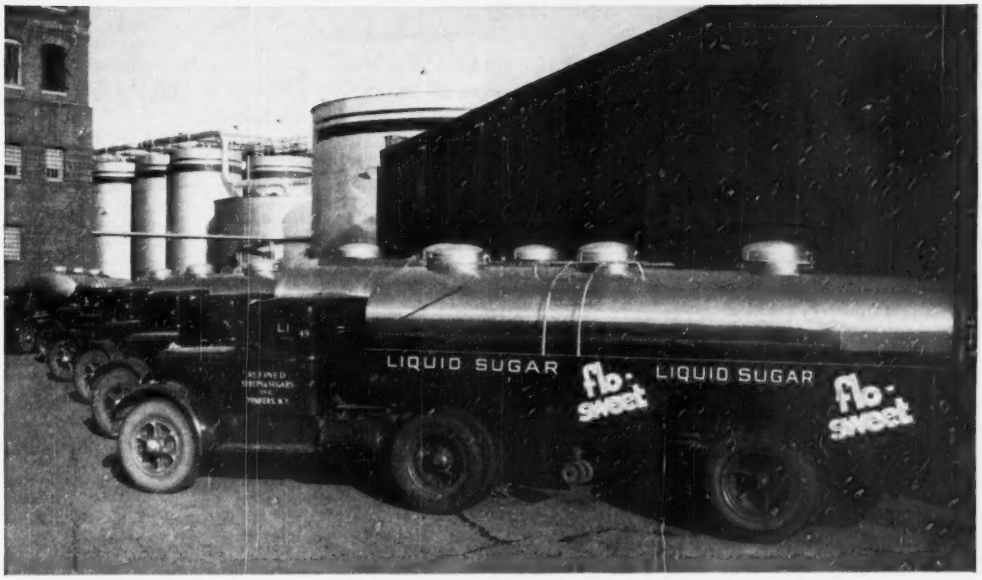


MAINTENANCE of this fleet is a round-the-clock job and is one reason for company's outstanding record.

High Safety Record Wins All-Round

Drivers for Refined Syrups & Sugars reduce insurance rates and build both employee and public relations through program that wins contests

SAFETY CONTESTS, closer driver supervision and top-notch maintenance of the fleet of the Refined Syrups & Sugars, Inc., Yonkers, N. Y., have reduced the company's cost—actual dollar cost—of truck fleet insurance by 62 percent over the three-year period from 1946 to 1948.

In fact, the safety record of the fleet is so outstanding that for those three years the company drivers placed first in the suburban Food Products Section of the Inter-Fleet Accident Reduction Contest sponsored by the Greater New York Safety Council.

Only a Beginning

But safety contests have never of themselves produced a low accident record. They are the window dressing of such an attempt. The real, fundamental reason for an outstanding safety record is the determination on the part of management to seek to attain such a record—and then to do something about it. And once done, management must keep continually at the task. Otherwise the attempt to attain the desired record will fail.

In the case of the Refined Syrups & Sugars, the management's decision to attain a safety record to help reduce the cost of P.I. (personal injury) and P.D. (property damage) insurance, began with the selection of the drivers. Of the 21 drivers now employed, 13 were promoted from other positions in the sugar refinery.

Thorough Examination

Each driver applicant is first given a complete physical examination to assure his physical ability to perform his work. Next, he is examined by the truck maintenance superintendent as to his ability to drive one of the company's six-wheeled trucks or tractor-trailer units.

After a period of training as a helper driver on one of the company units, he is assigned his own vehicle—when considered qualified to drive, in the opinion of the maintenance superintendent. Each year, the initial complete physical examination is repeated, to make certain that each driver continues to be physically able to drive.

To date, none of the company drivers has had to stop driving because of any physical defects. While the company has therefore not had to set up a fixed policy about transferring a man who could no longer drive, it is most probable that any driver who might have to discontinue because of health would be given an opportunity to remain with the company in another capacity.

This policy, unstated though it may be, is most important in building a good team of drivers. In effect, it gives each driver a job for life, provided his work and conduct are satisfactory. Thus, he enjoys a sense of security, so essential to a worker's mental well-being.

Plan Its Paying Off

The policy has paid off well to date. One of the drivers has been with the company 21 years. The service of the others range down to 5 years. The records of the company's Personnel Department, formed in 1943, indicate that only one driver has been discharged during the last seven years for infractions of rules.

Facts Tell Story—A Remarkable Record

Miles-and-Accidents Data of Refined Syrups & Sugars, Yonkers, N. Y., Operating Fleet of 21 Trucks and Trailers In the New York City Area.

		1947	1948	1949	3-year Totals
Miles run		303,575	460,169	414,229	1,177,973
Number of accidents		4	6	7	17
Miles per accident		75,894	76,695	59,176	69,292
Percentage reduction in company premium rate as against manual rate	Personal Injury	16	14	21	17 Av.
	Property Damage	21	27	24	24 Av.

Another morale builder provided by the company is a well-designed blue uniform and cap for each driver. The color matches the blue of the vehicles.

Care of Fleet

The management takes great pride in the mechanical condition and appearance of its fleet. The trucks are maintained by a crew of seven mechanics, greasers and washers.

Preventive maintenance is done every 20 days, when each vehicle gets a thorough checkup. Major repairs are made on week ends. Running repairs are made nightly as required.

The trucks are washed three times a week and repainted whenever necessary. They are never allowed to get shabby.

Real Morale Builders

The combination of top-notch mechanical maintenance, frequent painting, and every-other-day washing, taken in conjunction with the drivers' uniforms, helps to build driver morale. When the men make a delivery to a customer, they exhibit their pride in their company and their trucks.

The company management also considers that its drivers play an important public relations role. While on the street, they represent the company to the public, and they represent it to customers while making deliveries. Whenever a driver receives a compliment for good driving work on the road, it is reported in the company house organ.

Award Dinner

The company gives a yearly dinner to all its drivers and maintenance men, at which awards are made for safe driving. These affairs are attended by the company president, vice-presidents, and other executives, as well as by insurance company representatives and even outside guests, such men as the Yonkers Commissioner of Public Safety.

These annual automotive department dinners are in addition to any that may be held for the presentation of awards by the Greater New York Safety Council—prizes won by the Refined Syrups drivers in competition with other food companies.

From all of the foregoing, it is seen that Refined Syrups drivers really "belong." Under such conditions, it is no wonder they have won first-place honors during the years the plan has been in effect.

Fair Contest

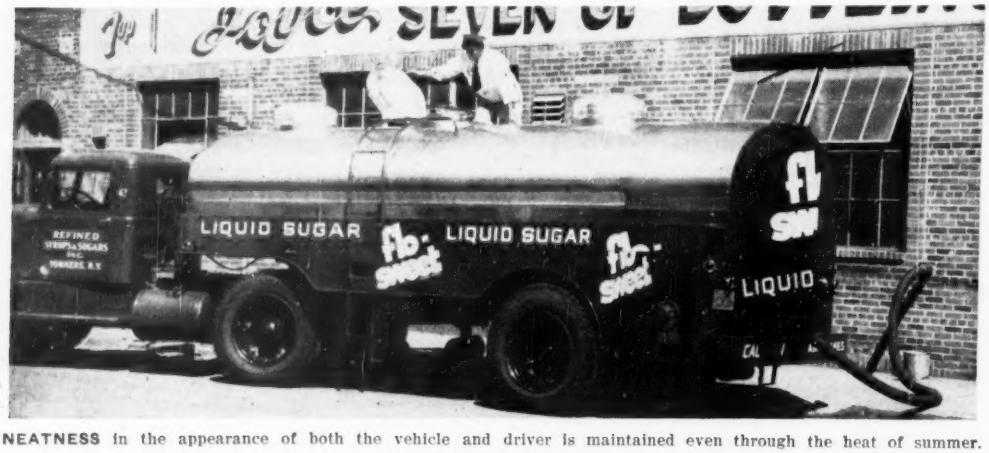
In the Greater New York Safety Council safe-driving contests, reportable accidents are those involving the contestant's vehicle with another person, or another's property or vehicle, resulting in death, personal injury, or property damage. Accidents involving only the contestant's own vehicle or property are not counted.

Another non-reportable accident is that where the contestant's vehicle is damaged while standing still and properly parked at the curb, edge of highway, in a yard, garage, driveway, alleyway, or at a loading platform in such a manner that its position does not interfere with the safe flow of traffic.

Around Clock Duty

The company maintenance crew of seven men, work in three shifts the week around, including Saturdays and Sundays, so that there is always at least one man on duty. This crew is included in the safety contest because one of its regular duties is to drive the trucks from the company garage to the loading station. This is done at night so that all of the trucks get an early start on the first trip the following morning.

The fleet of trucks, with which the drivers have made their outstanding safety record, was described in FOOD INDUSTRIES for June 1945. It consists of six-wheeled trucks and tractor-trailers, with tanks of from 1,500 to 2,600 gal. each. These vehicles originally introduced to provide a quicker and cheaper method for delivering sugar in liquid form.



NEATNESS in the appearance of both the vehicle and driver is maintained even through the heat of summer.

Cut Your Food Costs With Humidifiers

When properly installed, these units can control plant moisture, thus upping output, efficiency, and product quality

TYLER G. HICKS
Mechanical Engineer, Summit, N. Y.

A higher production rate, increased personnel efficiency, and better product quality can be attained in many food plants by the use of humidifiers—units that now offer special economy dividends through utilization of steam and water sprays.

Food storage and the various food manufacturing operations require accurately controlled humidities to prevent loss of product weight and quality. In the manufacturing areas air conditioning provides the best means for humidity control, but the initial cost occasionally rules out this method. In other instances, only a portion of the food plant is air conditioned at the time of construction; accordingly, a later expansion of manufacturing facilities may necessitate use of unconditioned spaces. And poorer quality and less efficient production are almost always associated with use of such unconditioned areas.

Water vs. Steam

Two common types of spray humidifiers (water and steam), together with their proper piping connections, are shown in sketch at left. Steam is usually considered a better humidifying medium than water because the moisture enters the room in the vaporized state. Heat from the room is not needed for moisture vaporization.

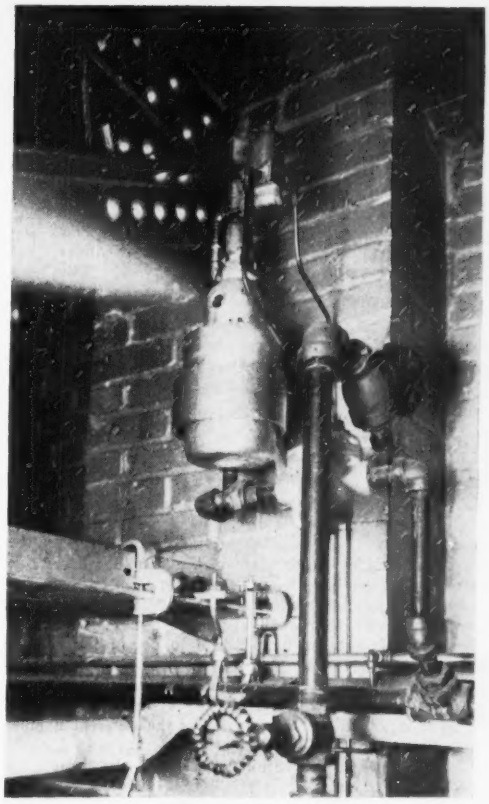
When moisture is sprayed into a room, the water that is utilized must first be vaporized before it can perform its humidifying function. Room air supplies the necessary heat, with a resulting decrease in temperature. Food manufacturers have found that, in general, it is more economical to vaporize humidifying moisture in a boiler than by using room heat in the manufacturing area.

Water sprays are good in warm climates, where room temperature reduction and humidification are both desirable. A water spray, in sufficient quantity, can reduce room temperature as much as 30 deg. F., if desired. Spraying of steam into a food manufacturing area actually raises air temperature (1 to 2 deg. F.). Therefore, the choice of humidifier is a function of geographic location of the food plant and desired temperature conditions.

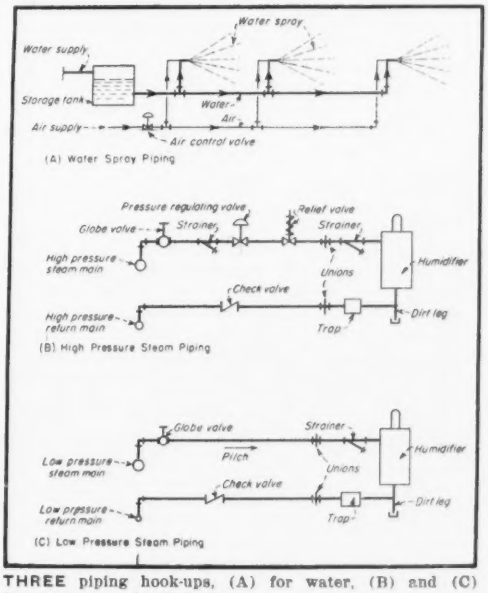
Factors Affecting Capacity

Desirable humidities and dry-bulb temperatures for various food industries are listed in Table I. The values given are suitable for all ordinary food manufacturing operations, though local conditions may require slight variations. This listing is especially helpful when estimating humdifier capacity and cost for a given food plant.

Humidifier capacity is a function of: (1) Room relative humidity necessary, (2) dry-bulb temperature in the room, (3) minimum outdoor temperature in the plant locality,



CLOSE-UP of humidifer in action. Mounted on prevailing-wind wall, it takes advantage of natural air drift.



THREE piping hook-ups, (A) for water, (B) and (C) for steam, are detailed above

Shortcut Data for Specifying Right Humidifier

TABLE I—DESIRABLE Humidities and Temperatures for Food Industries

Process	Temp., Deg. F.	Percent R. H.
Yeast storage	32–45	60–75
Flour storage	65–75	55–65
Proof boxes	90–95	80–90
Loaf cooling	70	60–70
Dough fermenting	80	76–80
Hard candy making	70–80	30–50
Candy storage	60–68	50–65
Sugar storage	80	35
Meat ripening	40	80
Grain storage	60	30–45
Apple storage	31–34	75–85
Egg storage	30	80
Citrus fruit storage	32	80

TABLE II—MOISTURE Content of Saturated Air (Grains of Water Per Cubic Foot of Air)

Temp., Deg.F.	Grains	Temp., Deg.F.	Grains	Temp., Deg.F.	Grains
−50	0.0283	−5	.3692	40	2.863
−45	0.386	0	.475	45	3.436
−40	.0525	5	.609	50	4.106
−35	.0708	10	.776	55	4.889
−30	.0945	15	.984	60	5.795
−25	.1261	20	1.242	65	6.845
−20	.1662	25	1.558	70	8.055
−15	.2182	30	1.946	75	9.448
−10	.2847	35	2.376	80	11.04
				85	12.87
				90	14.94
				95	17.28
				100	19.95
				105	22.95
				110	26.34
				115	30.13
				120	34.38
				125	39.13
				130	44.41
				135	50.30
				140	56.81
				145	64.04
				150	71.99
				155	80.77
				160	90.43
				165	101.0
				170	112.6

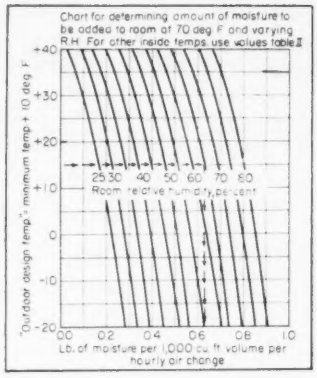


Chart for determining amount of moisture to be added to room at 70 deg F and varying R.H. For other inside temps. use values table II
+40
+30
+20
+10
0
-10
-20
25 30 40 50 60 70 80
Room relative humidity, percent
Outdoor design temp.° minimum temp + 10 deg F
00 02 04 06 08 10
Lb. of moisture per 1,000 cu. ft. volume per hourly air change

(4) number of hourly air changes in the room, and (5) absorption by hygroscopic materials which pass through the manufacturing area.

Relative humidity and dry bulb temperature can be obtained from Table I. Weather records will supply the minimum outdoor temperature in the plant locality. This minimum value is used only as a starting point in humidifier calculations, because the lowest temperatures seldom prevail for more than a few hours. Hence, 10 deg. F. is added to the minimum outdoor temperature to obtain the "design outdoor temperature".

Number of hourly air changes can usually be assumed as two, but some plant ventilating systems may supply more changes, and in these instances the different number must be reckoned in any calculations.

Bread, crackers, macaroni, flour, starch, and gelatin are a few of the common materials which absorb or release moisture in food plants. Since product quality is usually directly dependent on moisture content, controlled humidity will often cut rejects. The room humidifier must supply sufficient moisture to take care of any absorption by hygroscopic materials plus the amount of moisture required for air changes.

In general, the two aforementioned air changes are sufficient to care for a moderate amount of absorption. If a larger amount is anticipated in the food plant, the weight of moisture required should be added to the amount needed for humidification.

Tables and Chart Speed Calculations

Two typical selection problems for food plants will be given. These problems will illustrate the use of our accompanying tables and chart specially prepared to speed humidifier selection. (In attacking his own problem, the processor should first refer to Table I for the desirable conditions most pertinent to his own case.)

Problem 1: A New Jersey baking plant has a loaf cooling room of 50,000 cu. ft. volume. Minimum outdoor temperature in plant locality is +5 deg. F. How much moisture, steam or water, must be supplied to room if a 70 deg. F. dry-bulb temperature and a 65 percent relative humidity are required? Moisture absorption by products in the room is estimated to be 50 lb./hr., and plant ventilating system supplies four air changes per hr.

Solution: For food plants with a 70 deg. F. indoor temperature and various relative humidities, the accompanying chart may be used. First find the "design outdoor temperature," say 5 F. + 10 F. = 15 F. Enter the chart at 15 F. and run across horizontally to the 65 percent relative humidity curve. Then drop vertically to the bottom of the chart and read 0.63 lb. of moisture per 1,000 cu. ft. volume per hourly air change.

Since there are four air changes per hr. and the room has a volume of 50,000 cu. ft., humidification moisture $= \frac{4(50{,}000)\ (0.63)}{1{,}000} = 126$ lb./hr. Hence, total moisture, steam or water, is 126 + 50 = 176 lb./hr. A humidifier with a capacity equal to or greater than this value would be selected.

Problem 2: It is desired to maintain a 65 deg. F. dry-bulb temperature and a 60 percent relative humidity in a flour storage area. How much moisture must be supplied if the room has a volume of 63,000 cu.ft., a minimum outdoor temperature of —15 deg. F., and two air changes per hr?

Solution: The chart is suitable only for indoor temperatures of 70 deg. F. For other indoor temperatures, Table II must be used. At the "outdoor design temperature" of —15 F. + 10 F. = —5 F. saturated air contains 0.369 gr. per cu. ft. (from Table II). Saturated air at 65 deg. F., i.e., at 100 percent relative humidity, contains 6.845 gr. per cu.ft. At 60 percent relative humidity, it has 0.60(6,845) = 4,107 gr. per cu. ft. The difference, (4.107–0.369) = 3.738 gr. per cu. ft., must be added to the humidifier. Since there are 7,000 gr. in a lb., humidification moisture $= \frac{2(63{,}000)\ 3.738)}{7{,}000} = 67.2$ lb./hr., say 70 lb./hr. A humidifier with a capacity of 70 or more lb./hr. would keep the flour in good condition.

Where Units Are Installed

Correct installation locations for one and more humidifiers depend upon certain factors: Proper location is necessary to take advantage of the prevailing wind in the plant locality and to provide a uniform, continuous circulation of air throughout the food manufacturing area. When only one humidifier is used, it is placed near the prevailing wind wall and arranged to discharge parallel to the wall exposed to the prevailing wind.

Two humidifiers are generally located in opposite corners of the food manufacturing space, with their discharges used to produce a rotary air movement. Installations using more than two humidifiers generally have a slightly greater number on the windward wall to take advantage of the existing natural air drift from one side of the room to the other.

Pipelines for food plant humidifiers should be installed as shown in the sketch, unless there is some special reason for the manufacturer to advise otherwise. Locate humidistats to one side of humidifying moisture stream, 20 to 50 ft. away. For best results, humidistats should be mounted in the food production area, where they will control the humidity of the air important to output. Since the results of good control are shown in every food product leaving the plant, the time and effort spent in selection and installation is well worthwhile.

We Think . . .

▪ Water Shortage Poses Long-Range Problem for Industry

There is nothing surprising about the water shortage that recently has afflicted many communities in the northeastern part of the United States. It has become spectacular only because it has affected millions of people who did not realize that the supply of water is limited.

Water-tables have been receding for years. Wells must be drilled deeper and deeper. At the beginning of the century, one could drill into St. Peters sandstone in many areas of the Midwest and produce a flowing artesian well. This excellent water was so plentiful that wells were allowed to run for years, at rates as high as 300 gal. a minute. Then the flow became less and less, eventually stopping. Pumps and air-lifts had to be installed.

As recently as 1930, flowing wells were allowed to waste their water into highway ditches in Georgia and northern Florida. Waste in the good old American way goes on until some act of legislature puts a stop to it.

As a result of waste, plus increasing requirements, the country has been using up its water supply faster than nature has been replenishing it. From the long-range industrial viewpoint, the situation is most serious. Which makes it essential that industries, as well as individuals, conserve water as carefully as they do other valuable materials. Management not only should eliminate wasteful water usage, but should study processes to determine where improved methods or equipment will reduce water requirements.

Management also must reckon with the long-range water-supply picture before making decisions about locating new processing facilities or expanding existing plants. Water supplies that depend upon treated surface waters or streams are likely to be more dependable than deep wells, especially in areas where the water-table has been dropping steadily over a long period. Ground water supplies change very slowly. They may take many decades to come back if diminished rainfall is the sole cause of their decline. Prospects are even gloomier where over-use has depleted the supply in the face of normal rainfall.

The water problem is one that will be with industries, as well as cities, for a long time. It is not a nice problem, nor is the solution simple. But all of us must face it. We must become a nation of water misers.

▪ Little Business Has a Stake in Big Business

Uncle Sam's recent attacks against A & P, du Pont, and others, simmer down essentially to the charge that these folks got big—and because they are big they must be bad.

We like the way in which some of these big firms are answering the Department of Justice and demonstrating to the public that bigness, based on a recognition of value to the customer, is a constructive force.

We note especially the du Pont demonstration that perhaps only one in five of their big attempts at commercialization ever becomes successful, even though each may cost several million dollars. We share President Greenewalt's wonder as to how a little company can take so big a gamble as that. We are very sure that little food companies could not.

It is about time that persons interested in individual enterprise made it clear to the politicians that mere bigness is not a fair basis for antitrust action. Every big success generates hundreds of little ones that have to do with material supply, sub-contracting, merchandising, and what not. If we can't have the big successes, we surely will not have these little dependent ones. All little-business men had better make it clear that they really believe this.

▪ Six-Point Dairy Program Applies to All Food Processors

All branches of the food processing industry might well consider a recently proposed six-point program to benefit farmers and consumers. We refer to the plan which Borden's president, Theodore G. Montague, recently suggested to a Senate subcommittee. Although it is specifically for the dairy industry, the principles apply equally well to other branches of the food field.

The first point of Mr. Montague's program is a recommendation for continued research on better ways of getting the bulkier, more perishable milk products to the consumer with less labor cost per unit. This is particularly important in the case of fluid milk, where prices are directly dependent on the number of units handled per man-hour. But it is likewise important in respect to all processed food products.

Man-hours have become much too dear to waste. And curtailment in the number required is the most direct road to lower costs and prices. Lower prices are a must to meet competition. And they also will help the economy of the country. It is estimated that we spend $60 billion a year for food in this country. If food prices could be cut 10 percent, the $6 billion would be available for the purchase of other commodities and would give employment to an awful lot of people. It also would increase the per capita consumption of processed foods.

As point 2 in his program, Mr. Montague urges continued research seeking milk in a less perishable form, which will retain the desirable characteristics of fresh milk. In general food-industry terminology, this means extending the shelf-life of products, a business-building, cost-cutting proposition. This involves both the product and the package, and it brings up such considerations as the use of antioxidants and new packaging materials and technics. Among the latter are developments such as vacuumized flexible containers and the use of inert gas to protect the product.

Certainly the dairy industry is not the only one worried about product perishability. Think what bakers could save if the shelf-life of bread could be extended enough to avoid stale returns and eliminate consignment selling.

As his third point, Borden's president calls for promotion to increase the consumption of dairy products. Since

there still is a lot of room to increase the percentage of processed to total food consumed, the entire food industry has a promotion job to do.

Education to combat the groundless attacks on milk and milk products is the fourth point on the proposed program. Such attacks are being made on other processed foods, notably bread. And all major branches of the food industry are targets of the politicians.

Mr. Montague also urged sounder pricing policies to reduce recurring seasonal milk surpluses in high-cost marketing areas. All processors who buy direct from farmers should watch pricing policies and growers' contract terms to insure adequate supplies and to maintain the goodwill of farmers.

The final point calls for expanded efforts to lower milk production costs on farms. Certainly, this is one area which offers substantial opportunities, and it is one in which dairy companies and health authorities should cooperate with the producers. Canners and freezers have done much to help farmers grow more and better fruits and vegetables on the same acreage, and some have found it advisable to operate their own farms.

Yes, Mr. Montague's six-point program presents a challenge to all food processors.

▪ Direct Distribution System Is Gone But Not Forgotten

An innovation in frozen food distribution is being abandoned, but out of it has come some interesting angles on wholesale operations. We refer to the direct distribution system introduced in major markets by Snow Crop Marketers. This firm has been handling its own wholesale operations in 19 areas, while utilizing 86 regular wholesalers. Hereafter, only regular wholesale channels will be used.

J. I. Moone, president of Snow Crop., recently explained to members of National Association of Frozen Food Distributors why his firm happened to establish its own wholesale operations and what it learned from them. This information is of interest to other processors.

The management believed that the market could be expanded through lower prices, but it needed to know more about the wholesaler's functions and problems before it could develop an operating plan for wholesalers. So it adopted the direct wholesale branch system.

Here are some of the things the company learned: Costs are lowered by the policy of straight case sales. One man can assemble orders in full-case lots as fast as four men can handle the same amount of goods in broken cases. And the company believes that it lost no business as a result of this practice.

A second saving came from the fact that no breakup-room space was leased. Nor were warehouse personnel employed in filling retail orders. The straight-case policy made it possible to arrange for public warehouses to fill and case-mark retail orders. The cost of this latter service is placed at 1¢ per dozen.

The Snow Crop wholesale branches established a dual price list—store-door delivered and f.o.b. warehouse, the latter being 7 percent below store-door prices. And the company developed a very sizeable volume of business on the latter price, particularly with the national corporate chains, local chain stores, and multiple supermarket operators. The average small independent retailer, however, usually preferred store-door delivery.

As a result of its wholesale experience, the company developed its own distributor program. It eliminates the distributor's investment in inventories by stocking a full line of products in a key warehouse near the wholesaler's place of business.

It packs all fruits and vegetables one dozen to the case to reduce the warehouse costs of assembling orders.

It maintains its wholesalers in a strong competitive position by the two-ply price structure.

It "assures" a reasonable profit to distributors through margins established on the basis of actual cost experience.

Obviously, Snow Crop's temporary experience in direct distribution has been educational.

▪ Refrigerator Car Research Is Badly Needed Project

Transportation of perishable foods by refrigerated railway car remains in the horse-and-buggy stage. Ice and salt still are the means of cooling such cars, except for a couple of new test projects where mechanical and split-ammonia refrigeration are employed.

Ice and salt do not produce low enough temperatures for frozen foods, nor do they maintain anything like the optimum temperature for any perishable. Automatic control of car temperature is impossible, and too many stops and too much delay are involved in re-icing on long hauls. Heating of cars carrying perishables in winter remains in an equally backward state.

In one year (1947) no less than 1,688,288 carloads of refrigerator car traffic was carried on Class 1 railroads. It is estimated that about a million of this total were iced. This would seem to be an operation of sufficient magnitude to support a reasonable amount of progress in refrigerated transportation facilities.

The first step that should be taken to bring about improvement has been suggested by agricultural engineers. It is the construction of a laboratory large enough to accommodate two refrigerator cars and equipped to provide wind, temperature and humidity conditions such as are encountered in cross-country runs. Precooling facilities and a vibrating mechanism to simulate road bounce would be included.

Such a laboratory would enable development of better cars and more satisfactory refrigerating and heating methods. And it would permit research on precooling, as well as on methods of packing produce for shipment and on car loading arrangements.

Food companies and their customers, or practically everyone in the country, would benefit from the higher quality of perishables shipped under improved conditions.

The railroads would benefit through reduced spoilage claims and a stronger competitive position with respect to trucks. They might even shorten the time that cars are tied up on a given run, and curtail damage to their equipment from salt brine.

All in all, it looks like enough would be gained to justify the construction of a refrigerated freight car laboratory. It has been proposed that this project be undertaken by the Department of Agriculture and cooperating organizations.

People in the food field should lend support to this suggestion. Certainly, food processing companies and the railroads which haul large quantities of perishables should be among the principal cooperating organizations.

1950 . . .
Our Industrial Machine Is Running Down

In his recent Economic Report to Congress President Truman chalked up a constructive advance in his economic reasoning. He pointed out that if we are going to attain the worth-while goal of a $300 billion national income in the next five years, we must equip ourselves with more and better industrial tools. Of all the dynamic forces of expansion in America, he said, one of the most important is business investment.

That is fine. It is basic common sense. We have been saying that for years and we are glad to hear the President say it too.

But having hit this new high in his economic reasoning, the President failed to draw the right conclusion. He made the mistake of accepting the false conclusion that there is no shortage of business funds to pay for more and better industrial tools. "There are immense opportunities for business investment in nearly every segment of the economy," the President said, and further, "there are in general sufficient funds available to businessmen who want to seize these opportunities."

That just is not so – and the lack is not only serious; it can well be fatal.

It is a matter of the most urgent national importance that the President's recognition of the need of more and better industrial tools should be followed by effective action. *That calls for changes in the national policies that are now blocking and, unless changed, will increasingly block business from meeting this need. If business cannot get enough new tools, the result will not be higher, but lower standards of living five years from now.*

The President should talk this matter of business investment over with Senator O'Mahoney, the Chairman of the Joint Congressional Committee on the Economic Report. Senator O'Mahoney would take to the discussion knowledge of the investment situation recently acquired through his conduct of a series of Congressional hearings.

If he told the President what he told the press during the course of these hearings, he would say, "the private capitalistic system is being seriously threatened by a lack of venture capital." That is in direct conflict with the President's conclusion that "there are in general sufficient funds available."

This serious shortage of adequate investment in new plant and equipment is brought forth so that all of us can understand it by McGraw-Hill's annual survey of American industry's plans for investment in new plant and equipment in 1950, which has just been completed.

continued on next page

BUSINESS' PLANS FOR 1950

These are the major findings of the McGraw-Hill survey of "Business' Plans for New Plants and Equipment" in 1950. Made by the McGraw-Hill Department of Economics, the survey shows:

1. Industry – as represented by manufacturing, mining, transportation, and utilities – now plans to invest $12.4 billion in new plants and equipment this year. This is 13% less than was actually spent last year.

2. Manufacturing industries alone plan to spend $6.3 billion in 1950 for new facilities. This is also 13% less than they spent last year.

3. Manufacturers as a whole expect their 1950 sales volume to about equal 1949's.

4. Manufacturers will expand their capacity about 3% in 1950, under present plans. The largest part of their funds, 65%, will go to replace and modernize existing facilities.

5. Profits and reserves are expected to provide 92% of the 1950 investment funds of manufacturing companies. These companies count on new common stock issues to provide less than one-half of one per cent of the investment funds they will need.

6. Two out of three manufacturing companies review their investment plans monthly. Almost all companies go over them at least quarterly. The survey shows that companies changed plans rapidly during 1949 to meet changes in their prospects.

7. Other industries are also reducing their investment plans in 1950 by 13%. This coincidence arises from the fact that utility companies, notably the electric light and power companies, plan to spend only slightly less than in 1949. Railroads, on the other hand, are reducing their capital programs in 1950 by more than 40%.

A copy of a complete report on "Business' Plans for New Plants and Equipment" may be obtained by writing me at McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 18, N. Y.

The results of the survey, which are summarized above, show that American Industry – as represented by manufacturing, mining, transportation and utilities – is planning to spend 13 per cent less for new plant and equipment in 1950 than it did in 1949.

Since the rate of investment in new plant and equipment right now is apparently about 15 per cent below the rate for 1949, the present level of business investment may be relatively steady in 1950. That would relieve the fear, expressed by President Truman in his Economic Report, that "if the downward trend in business investment were to continue, our prospects for full recovery and continued expansion would be seriously endangered."

BUT, at the rate of investment planned by American manufacturing industry for 1950, it would take 40 years to modernize thoroughly our present industrial plant and equipment. That would still leave undone the job of increasing it to meet the needs of an expanding economy of the kind sketched by President Truman in his message.

In attaining even this rate of investment, the McGraw-Hill survey shows American business must rely overwhelmingly on its own profits, which have declined as the country has left the postwar boom behind it. Most American companies cannot sell new common stock except at ruinously low prices. Here is one case where government action is really needed to help business and help to keep a rising American standard of living.

In order to get enough business investment to assure the "full recovery and continued expansion" sought by the President, our country needs:

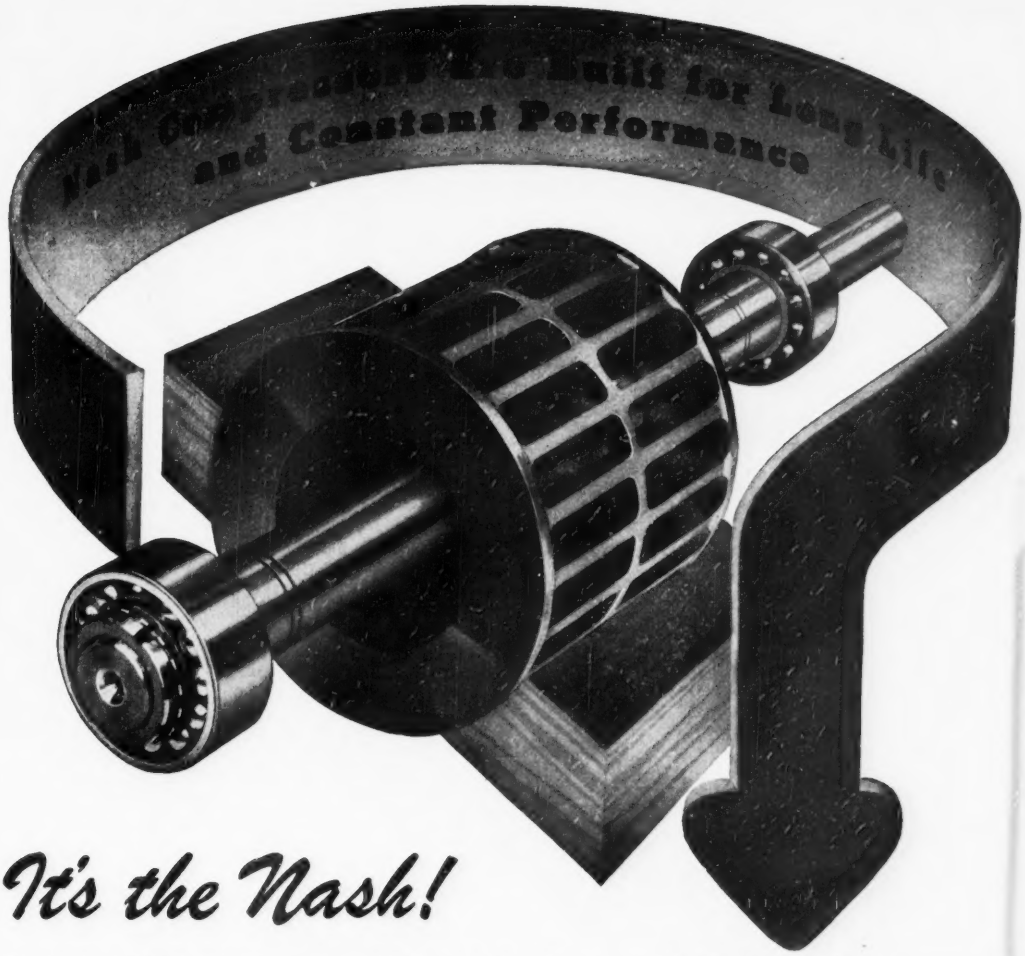
1. Lower taxes on business income so as to release more money for new plant and equipment.

2. Liberalized depreciation allowances on old plant and tools so that business can buy new equipment faster.

3. Repeal of the present double taxation of dividends which now are taxed once as corporation income and again as personal income.

It is encouraging to have the President explicitly recognize the key importance of adequate business investment in providing steadily expanding prosperity. The next and most important thing to do is to make this recognition effective by discarding national policies which are blighting an adequate volume of business investment.

President, McGraw-Hill Publishing Company, Inc.



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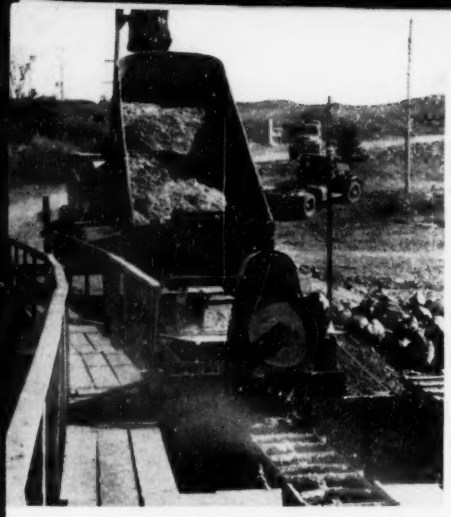


1 **WASTE,** first dumped into hopper, is fed into raw box (bottom).

2 **FEEDING** sardine waste from 3-bin raw box holding 60 tons. It goes on conveyor that delivers it to reduction plant (background).

Recovering Byproducts From Fish Waste

New Process Now Extracts Condensed Solubles After Oil and Meal Are Salvaged

(Article on Page 54)

CONDENSED FISH SOLUBLES are produced at the new byproducts recovery plant of Associated Fish Products Co., Eastport, Me., by the specially developed Sharples-Lassen process that uses stickwater from the company's standard operation—reclamation of oil and meal from sardine waste.

Working 15 tons of waste per hour, the plant had a recovering performance of 100 gal. of fish oil and ½ ton of meal. And now, with introduction of the new process, an added 2,250 to 2,625 lb. of condensed fish solubles are produced. Better than that, an additional 5 to 10 gal. of oil are now reclaimed, and another 50 lb. of high-protein fish meal per 1,000 gal. of stickwater. The operation—

First step is the cooking and pressing of the waste to obtain the press cake and the press liquor—as illustrated at Points 3 and 4 in our fold-out flowsheet (right).

Next (Point 5) comes the second step—manufacture of fish meal. In this operation, press cake is dried to an 8-percent-moisture content in a continuous, direct-fired rotary dryer. Production of the meal is then completed when (Point 6) press cake leaves the dryer and is cycloned, ground, cooled and bagged.

Clarification of the press liquor is the third step. Leaving the continuous, horizontal screw presses, the liquor is pumped to centrifuges (Sharples Super-D-Canters), which separate 2,500 lb. of suspended solids an hour from the liquor. These solids are added to press cake entering the dryer. The clarified press liquor (about 1,800 gal. per hr.) is pumped to the stickwater plant.

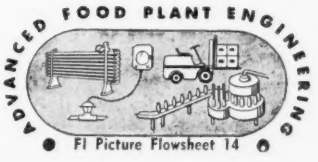
Now to the fourth step—recovering the fish oil. Liquor is heated to 200 deg. F. in a heat exchanger and delivered to a tank that gravity-feeds it to a high-speed centrifuge (seen in the background of Photo 7. About 100 gal. of oil per hour are recovered. And at this same station the additional 5 to 10 gal. of oil an hour are obtained—from acidulated stickwater worked by a second centrifuge (foreground of Photo 7).

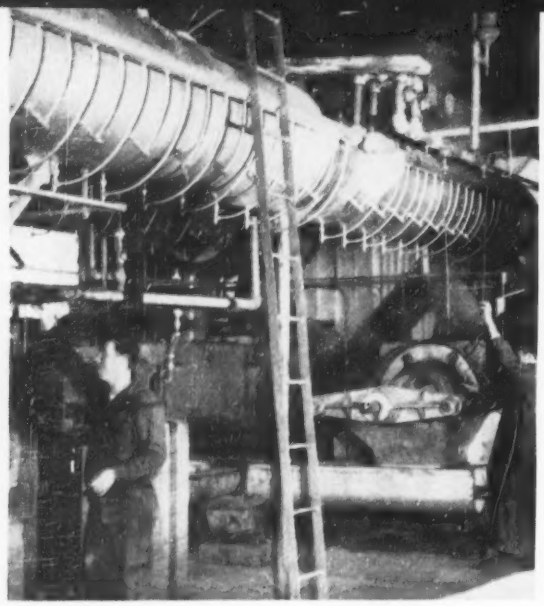
Clarifying the stickwater—removal of 0.75 percent insoluble solids and 1 percent oil—is the fifth step. Liquor leaving the first centrifuge is now pumped to the acidulation tank, together with enough 66 deg. Bé. sulphuric acid to lower the pH of the stickwater from 6.5-7.0 to about 4.5. The acidulated stickwater is held in the tank for 30 min. to coagulate the suspended solids. Next, the stickwater (1,000 gal. lots) is centrifuged (Point 8) to separate meal.

Before the stickwater is condensed, an additional small amount of oil is removed. And now, continuing the process, the stickwater—free of suspended solids—is pumped through another heat exchanger, where its temperature is again raised to 200 deg. F. Then, the heated stickwater is centrifuged once more to obtain the additional oil.

Condensing the stickwater is the final step. With the insoluble solids and oil removed, the clarified stickwater is delivered to the double-effect evaporators (Point 9).

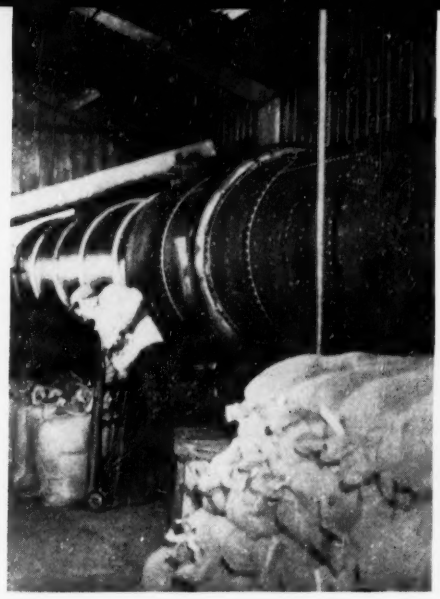
FOOD INDUSTRIES Feb. 1950 Pages 96-99





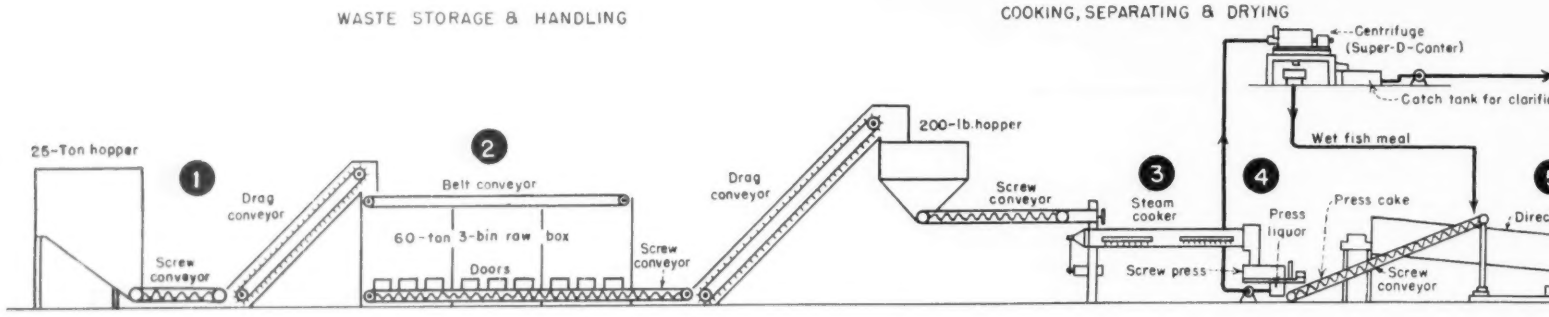
3 **CONTINUOUS COOKERS** (top) prepare waste for pressing. Capacity of each cooking unit is 10 tons per hr.

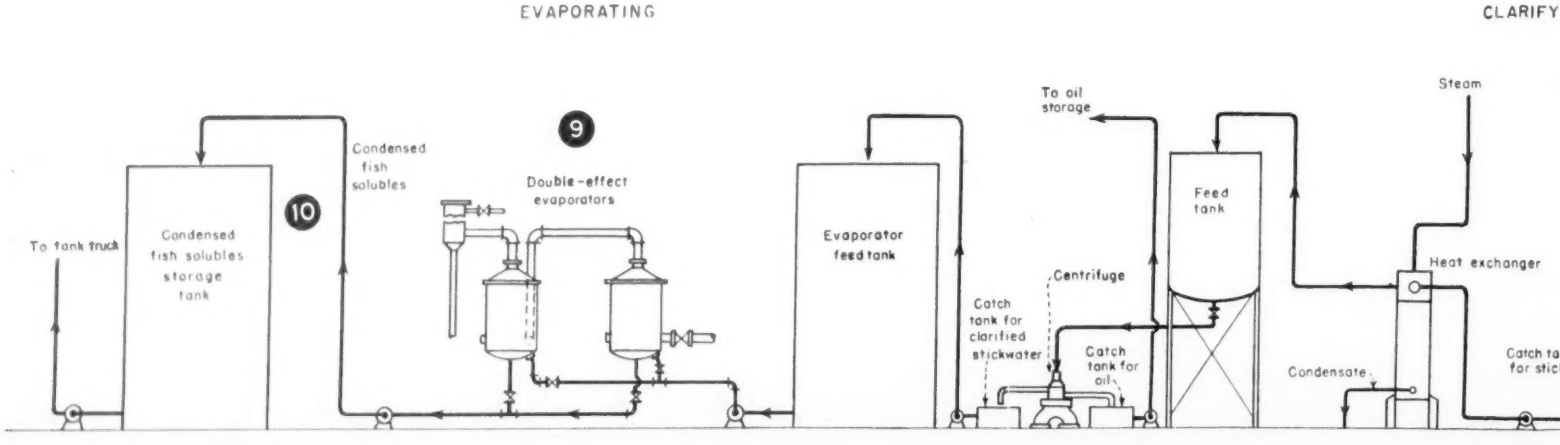
4 **HORIZONTAL SCREW PRESS** continuously separates press cake from press liquor.

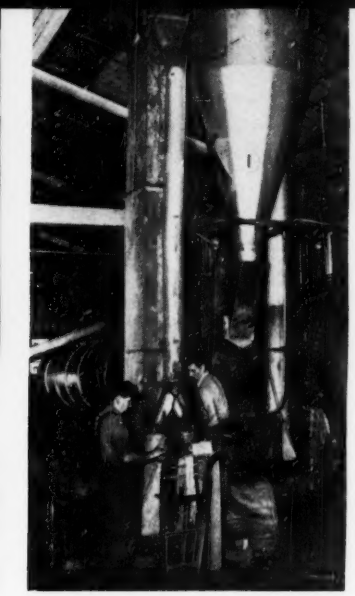


5 **ROTARY DRYER** dehydrates press cake at rate of ½ ton of dry meal per hr.

6

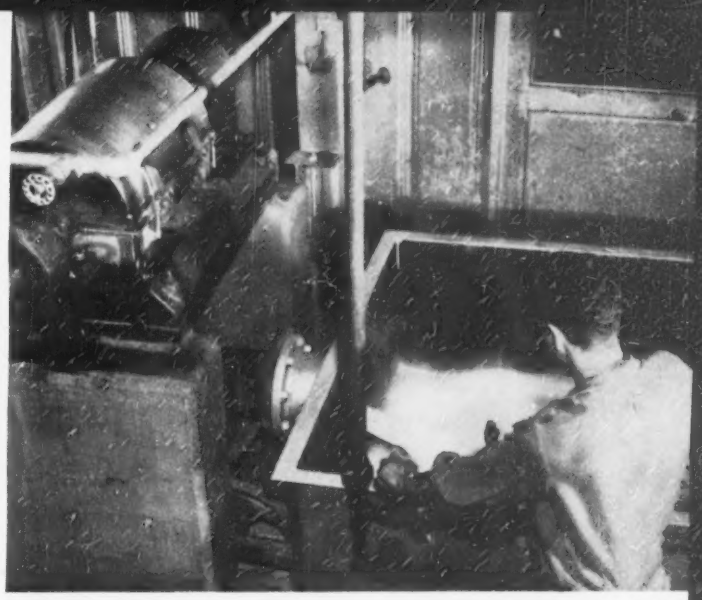






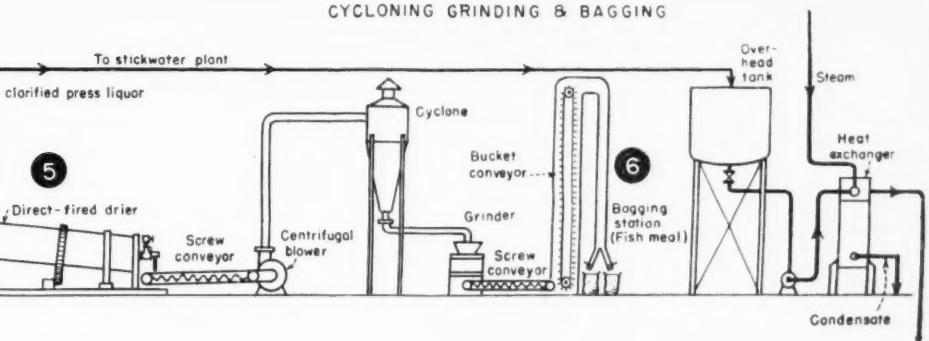
6 **GRINDER** (center) pulverizes fish meal prior to bagging (foreground).

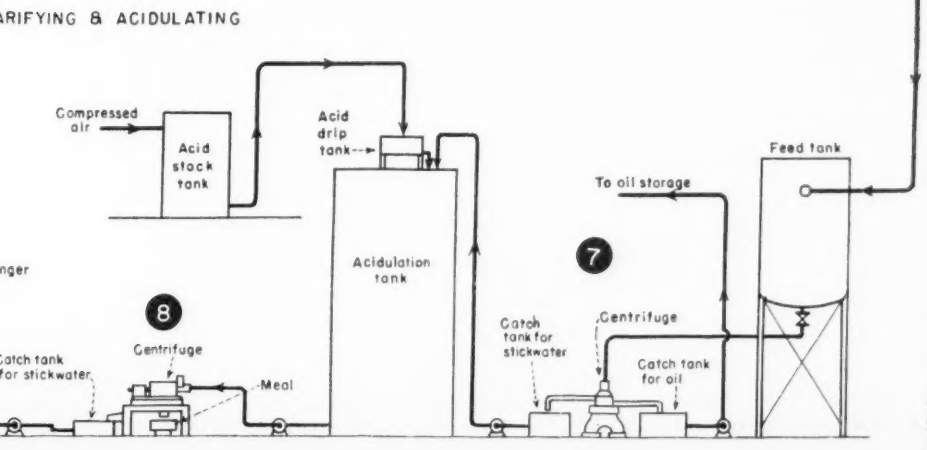
7 **CENTRIFUGES** separate oil—from press liquor (background); and from accidental stickwater (foreground).

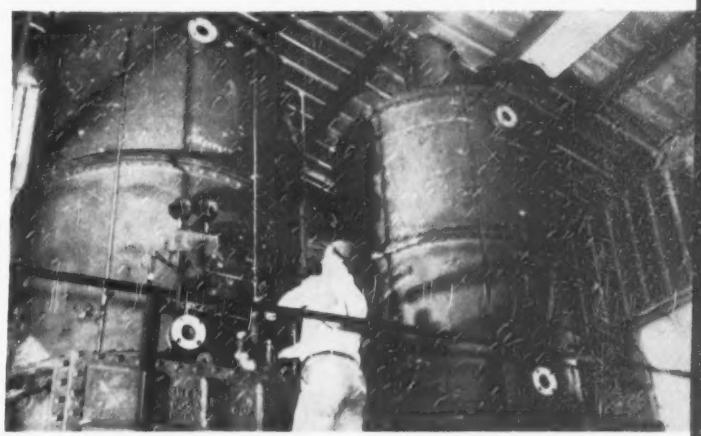


8 **HERE**, another centrifuge recovers meal from acidulated stickwater.

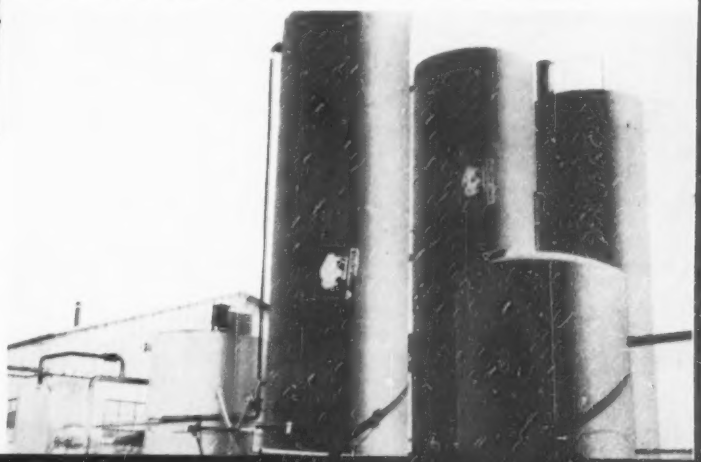
9 **DUAL EVAPORATORS** (photo below) produce condensed fish solubles.

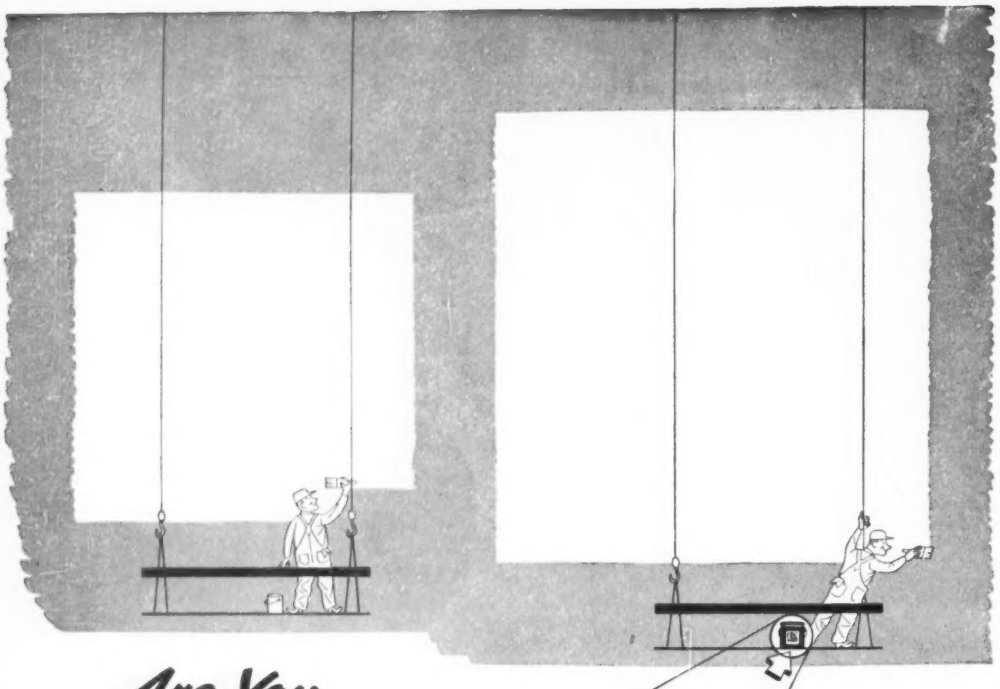






10 **ACIDULATION TANKS** (extreme left and right) hold stickwater. Two tall tanks (center) each contain 25,000 gal. of condensed fish solubles.





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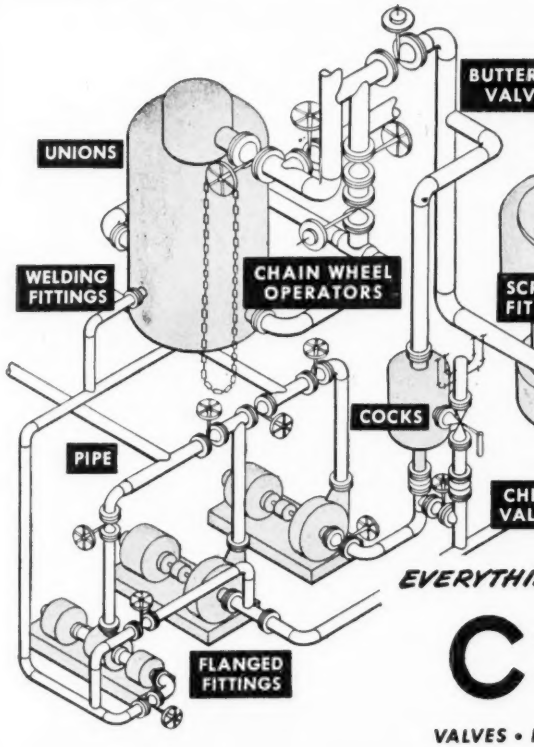

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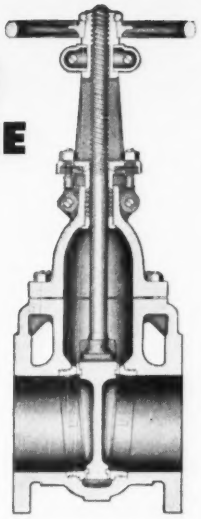

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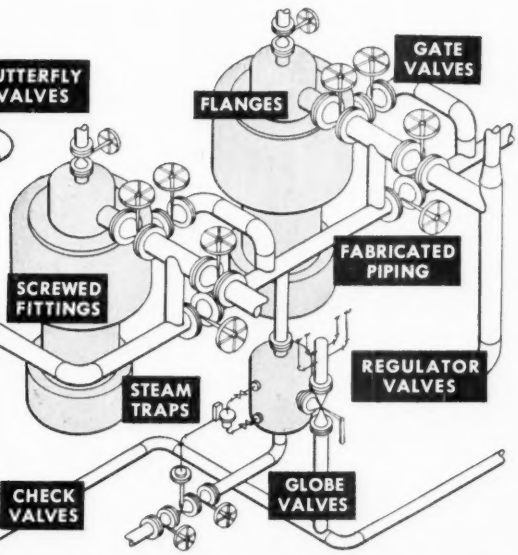

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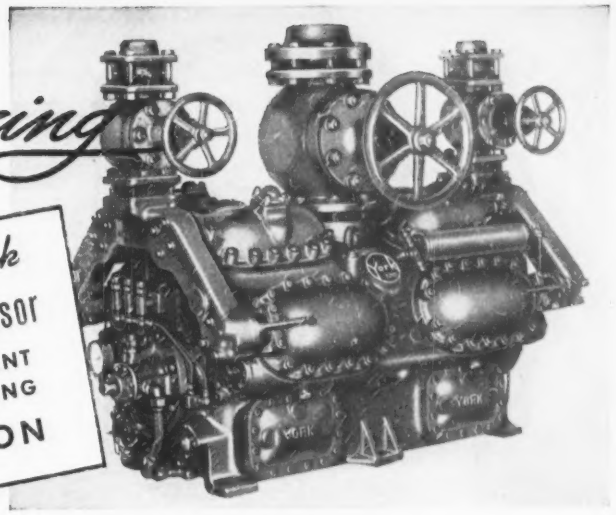

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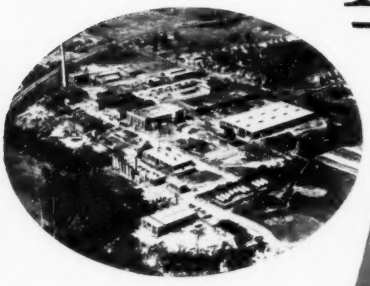

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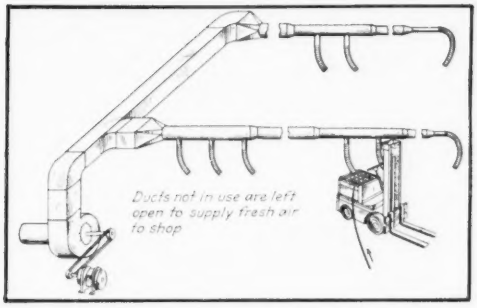
Riegel *Tailor-made Papers for Protective Packaging*

PRACTICAL IDEAS



Cooling of Batteries Speeds Charging

Blowing of cool air over industrial storage batteries while they are being charged has produced substantial savings at the Diamond Crystal Salt Co. plant in St. Clair, Mich.

When a battery is taking a charge, it generates heat. And, if it becomes overheated the battery is injured. Heat slows the rate of the charge, but by providing a constant supply of cool air and aiming it directly at the battery, this heat is rapidly removed. Thus the temperature is kept down, and faster charging results.

At Diamond, fresh, cool air from outside the building is drawn in and blown by a fan through a duct system (see sketch above). The ducts are constructed of thin-gage sheet metal. Outlets are made of flexible metal hose and are suspended from the main overhead duct. This system is installed in the battery repair room.

Besides speeding the charging time, the fan system also serves to keep acid fumes out of the room.

As now operated, this system is especially convenient for use at noon, when the trucks are brought in for a booster charge. Ordinarily, it would be necessary to let the batteries cool off for a while before being charged. But with the new system, this waiting period is eliminated. Charging can be started at once, and batteries can be put right back to work.

Saving in charging time is three hours per shift. Dollarwise, that's in excess of $1,000 per year.

And there is an even greater saving—through the lengthening of the life of each battery by as much as 12 to 18 months. Diamond uses 36 batteries, so the annual saving approaches the $5,000 figure.

Since cost of installation was less than $500, the savings listed above, represent an excellent return on the investment.—*M. J. Gearing, Plant Superintendent, Diamond Crystal-Colonial Salt, Div. General Foods Corp., St. Clair, Mich.*

Water Line Repaired by Welding

Occasionally, it is necessary to repair a broken underground water line. And it can be done by welding.

One operator's handling of the job illustrates the procedure:

To provide the welder with plenty of working room, a hole was dug in the ground around the break. In this case, a small trickle of water continued through the pipe to the break, since it was found impossible to tighten the valve sufficiently to shut off the flow completely.

This trickle problem was solved by cutting two holes in the pipe prior to the break, thereby permitting the water to run out before it reached the point to be welded.

The break, and then the holes in the pipe, were welded.—*The Lincoln Electric Co., Cleveland 1, Ohio.*

$25 EXTRA FOR BEST ITEM

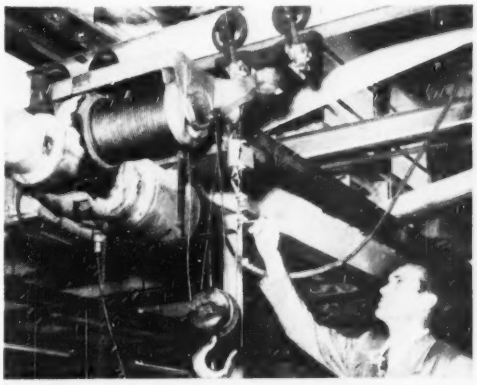
You are invited to submit items for this "Practical Ideas" department. You will be paid at regular rates when your item is published, and if it is judged the best for the month, you will receive additional pay of $25.

Selection of the best contributed item will be made by a group of 200 readers each month, and the name of the author and item title will be cited in these pages in a subsequent issue.

"Practical Idea" items may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. The item may concern factory, laboratory, warehouse, or power-plant operations in the food industry. "Practical Ideas" pertaining to management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit "Practical Ideas" items. The text will be edited and sketches converted to finished drawings.

Send your items to: "Practical Ideas" Editor, FOOD INDUSTRIES, 330 W. 42nd St., New York 18, N. Y.



Safety Device Avoids Hoist Overload

Tooling Superintendent Wally Marrow, at Solar Aircraft's San Diego plant, devised a unit which increases the safety factor of lifting equipment.

The new device limits loads within 95 percent of the hoist's maximum lifting capacity.

Mechanism comprises a heavy-duty die spring contained in a steel housing on which is mounted a solenoid. When the hoist picks up a load, the spring compresses. And as long as the load does not exceed 95 percent of maximum capacity of the hoist, the electrical circuit remains closed. But when the load reaches the point within 5 percent of the maximum capacity, the spring compresses fully and

BEST ITEM—Balloting by reader-judges on the Practical Ideas in December FI named as best the item, "Food Plant Equipment Easily De-Scaled." This piece was based on a "How To Do It" in the Cherry-Burrell Corp.'s "Circle," which is edited by Williams S. Stinson. —The Editors

actuates the solenoid, which opens the circuit, stops the up travel, and applies the brake. At this point, the only current operative controls the down travel.

This particular device was designed for use on a 2-ton Shepard-Niles hoist. Other hoists or cranes of different capacities can be similarly equipped by varying the size of the spring and calibrating it to the maximum safe load for the lifting equipment.

Chuck Does Better Capping Job

An arduous task is simplified and a more uniform job is accomplished by using a motor-driven flexible shaft, rotating chuck to screw caps onto glass jars of candy at the S. F. Whitman & Son candy plant in Philadelphia.

The caps are first started by hand, then chuck tightened. In addition to raising productivity, the tightener assures a good seal, thus the candy is protected against entrance of moisture.

In manual capping, lids are not always properly tightened, hence moisture can get into the jars, subsequently impairing the quality of the confections.

Can Your Floors "Take" the Trucks?

A recent study of the floor loads imposed by industrial power trucks provides a simple rule for determining whether a more careful analysis will be necessary to assure safety.

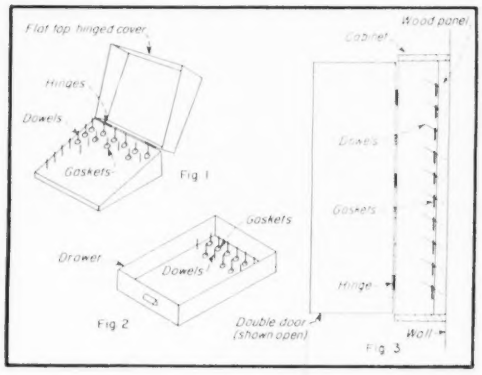
Conducted by the Philadelphia Division of Yale & Towne Mfg. Co., this study shows that a truck may be expected to impose a dynamic load on the floor about 1½ times the static weight of the loaded machine. The bending moment it produces is about twice that for uniform loading, since the truck is considered as a concentrated load.

Therefore, the combined effect of these two elements is that the floor stresses produced by the moving loaded truck will be approximately three times those produced by uniform loading conditions.

To determine what truck load a given floor will carry, consider the area comprising one bay. Now assume a 10-ft.-wide aisle in a 20 x 20-ft. bay, with the floor rated at a capacity of 250 lb. per sq. ft. for static loading. Then the allowable static load for the 10 x 20-ft. aisle area is 10 x 20 x 250 = 50,000 lb.

Now apply the factor of three, and the allowable loaded truck weight is 16,600 lb., provided that the storage areas along the aisle are not overloaded. Two or more trucks can pass safely if their combined weight does not exceed 16,600 lb.—a factor that must be watched particularly at elevators.

The tests in question applied particularly to concrete slab floors, hence further studies may be necessary with other types, especially wooden floors where only a few boards may receive the full weight of the truck. Furthermore, if the weight of the proposed trucks approaches the indicated safe loading, a detailed study should be made by a competent engineer.—*Release from Yale & Towne Mfg. Co., Phila. Div., Philadelphia 21.*



How, Why, and Where to Store Gaskets

Better methods of storing and holding pipe-line and miscellaneous gaskets, successfully employed by a Massachusetts dairy, keep them in proper order, assure their first class condition, and reduce waste due to careless handling.

Illustrated above are units used in three different methods. Fig. 1 shows a box with a slanted bottom and hinged top. Here, wooden dowels are employed, properly spaced to accommodate a number of the various-sized gaskets in their designated places.

In the second unit (Fig. 2), dowels are inserted in a drawer to be placed in a cabinet or table which may be conveniently located near their point of use.

The third storage space (Fig. 3) is provided by a wall cabinet equipped with cover or door.

It is well to remember that large rubber gaskets should not be suspended in a vertical position for any great length of time, because there may be a tendency for the gaskets to assume a permanent distorted shape.

Losses due to the damaging of new gaskets, misplacing, and misapplying them have been practically eliminated in the Massachusetts dairy. The dairy men, in their use of a drawer for storage, were surprised by the size required. Therefore, in planning a holder, care should be exercised, to get the right size. Likely, several drawers will be needed rather than a single large one. A separate drawer for each type of machine is another possibility.—*Based on item in Cherry-Burrell Corp.'s "Circle."*

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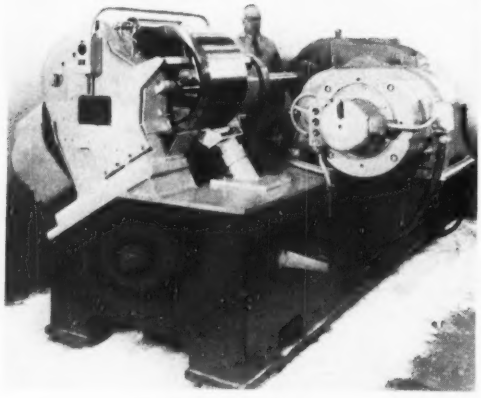
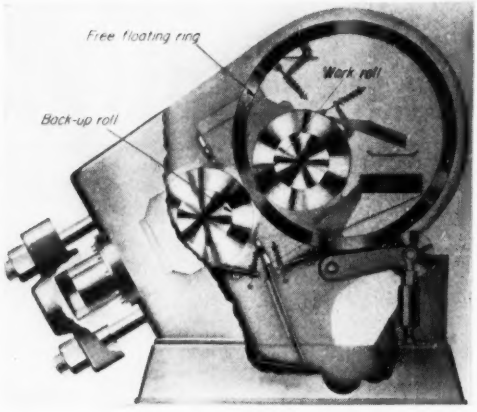


Research model . . .



. . . and its working parts

New Press Has Improved Feed, High Extraction

For the extraction of a wide variety of oils, juices, or other fluid components from fruits, vegetables, nuts, seeds, and berries, and for recovery of fibers from various plants, also the milling of powdered or granulated materials, a basic new machine has been developed.

In illustration (above left) is shown a research model which has been installed at the Armour Research Foundation. This model will be available for industrial experimentation.

Known as the Stacomizer, it offers a completely new and improved means of applying tremendous pressure to a continuous flow of materials.

The new unit is a continuous-feed, roller type hydraulic press built on a patented principle. In a standard rolling mill the work is done by two opposing rolls, while in the new device there are three rotating members—the backup roll, the work roll, and the floating ring.

The backup roll is driven and turns in a fixed position, while the work roll also driven is permitted to move in a fixed horizontal plane. The floating ring is not driven but revolves freely between the rolls which are under hydraulic pressure, that can be regulated up to 500 tons.

The floating ring is as wide as the rolls and approximately twice their diameter. All surfaces are smooth and impervious. The arrangement of the three elements is illustrated in a cut-away view of the machine (top right).

Material to be processed is fed into the lower part of the floating ring and is carried upward into the horn angle area formed by the outside surface of the work roll and the inside surface of the floating ring.

As the material comes under pressure in this area, the floating ring dips and, acting as a lever, forces the rolls apart. At the same time it opens up the throat of the angle by advancing its apex above the horizontal plane of applied pressure, thus eliminating the rigid "wedge angle."

In dipping, the ring mounts the material, compressing it into a blanket, which is rolled through the assembly under extremely high pressures without shear or grinding action. The extracted fluids are collected as they flow by gravity from the bottom of the floating ring. The remaining materials are removed by scrapers and conveyors.

Among the advantages claimed is its improved feed acceptance. The floating ring functions in such a manner that it substitutes a "floating" horn angle for the usual fixed wedge angle and literally forces the roll assembly to accept even soft materials. Uniformity of product is obtained because the full hydraulic pressure is exerted directly on the entire mass of material and there are no unprocessed or "dead areas."

A high percentage of fluid extraction results from the manner in which the greater pressures are applied. The principle of applying pressures progressively to a decreasing volume of material in a uniform manner, and in the absence of heat, obtains from plant life a natural fluid which is far more stable and less susceptible to deterioration.

Excessive heat is not generated due to the elimination of shear and grinding action and the relatively long horn angle feed area in which pressures are progressively redistributed by the action of the second yielding member, the free floating ring. This elimination of heat adds greatly to the quality of the product being produced by retaining unaltered vitamins, hormones, chlorophylls and elements of a volatile nature.—*Stacom Industries, Inc.*, 29-28 41*st Ave., Long Island City* 1, *N. Y.*

Bag Heat Sealer Speedier, Cuts Labor

Faster automatic production and better seals are reported provided by a new bag heat sealer.

Called the "Comet," the machine feeds itself automatically from a conveyor belt thus eliminating labor cost and speeding production.

It will fold and seal bags of any heat sealing material as fast as they are conveyed to it. Heavy bags up to 10 lb. or more of any width, can be handled without damage or difficulty. Through a new principle of increased "dwell",

pressure and heat during the sealing operation can be greatly reduced. And better and more resilient seals are the result of this improved action.

Movement of bags through the sealer is effected by two pairs of aluminum carriers that run the length of the machine. Action of these carrier bars is timed so that while one pair closes and grasps the bags, the other pair opens. Through the reciprocal action, these bars literally "walk" the bags through the machine.

Accidental tearing and pulling of the bags out of alignment are prevented because the carrier bars grasp the bags full length in one movement. The second improvement in the unit is the use of an elongated pair of heating jaws. Bags are moved through these jaws only a few inches at a time, thus receive several applications of heat and pressure. Because of this longer "dwell," heat and pressure need not be so extreme.—*Heat Seal-It Co., Lancaster & Parrish St., Philadelphia 4.*

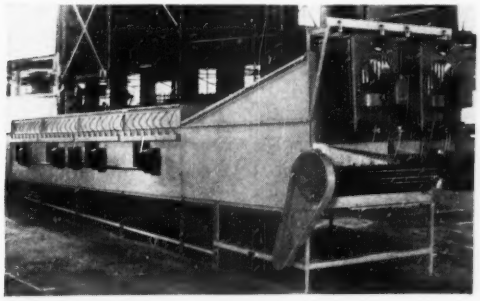
Hoist Conveyor Is Easy to Install

For elevating and lowering boxes, cartons and sacks between basement and first floor or for horizontal use, an easy-to-install conveyor has been announced. A rod control at side of machine provides easy starting or stopping of conveyor from top or bottom.

Known as the "UBV", it is a utility belt conveyor of built-up all steel frame design. Units up to 15 ft. 6 in. long are shipped completely set up; units 18 ft., 0 in. to 30 ft. 6 in. long are shipped in two or three pieces.

Two types, with or without gooseneck, are offered in four standard belt widths: 10, 14, 20, and 24-in.

Unless otherwise specified, unit is furnished without guardrails, wheel feed, and discharge stations, or electric motor.—*Standard Conveyor Co., North St. Paul 9, Minn.*

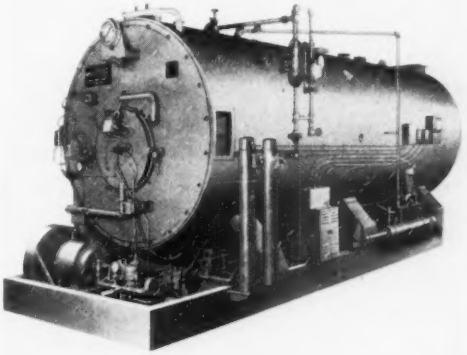


Washes and Dries Spuds Continuously

This new type of potato dryer incorporates continuous washing and drying with a minimum of materials handling. Machine comes in two sizes—one-half and one-car capacities. For drying, the half-car-per-hour machine uses 138 infra-red lamps, while the one-car unit employs 288 lamps.

Potatoes go through an initial fungicide bath. Then, approximately 17 gal. of water per car are evaporated by the infra-red lamps with the aid of a stream of hot air which is blown through the machine to provide even circulation. Infra-red radiations dry the surface, also getting into potato eyes and other depressions. The hot air comes from a heating unit using bottled gas as fuel. A ¼-hp. motor drives the fan.

In the lower half of cabinet, potatoes pass through turbulent, steam-heated air, which completes the drying operation. Also in this section is a battery of germicidal lights which kills germs not affected by the fungicide bath. —*American Machinery Corp., Orlando, Fla.*



Compact Generator Simply Maintained

Built for pressures from 15 to 200 lb., for operation with oil or gas, an automatic self-contained, 400 hp. steam generator has been developed.

Unit is rugged, compact, simple in design, and easy to maintain. In areas where both oil and gas are available, or seasonal costs vary, oil-gas combination burners are supplied by the company.

Furnished complete, the generator is ready for installation on customer's boiler room floor. When connected to steam, water, fuel and electric lines, breeching or stack, it is ready for operation. The only foundation required is a level floor of sufficient thickness to carry the load.

Furnace and tubes are arranged for the smooth flow of hot gases over all heating surfaces. This permits a high rate of heat transfer and a low exit gas temperature. And water circulation is speeded. As a result, commercially dry steam at operating pressure can be produced from a cold start in 20 to 30 min.—*Ames Iron Works, Oswego, N. Y.*

DON'T MISS THESE . . .

Quick freezer can continuously handle pound packages at 4,000-per-hr. rate.....Page 108

New truck line comprises 87 separate models, completely redesigned from stem to stern.....Page 110

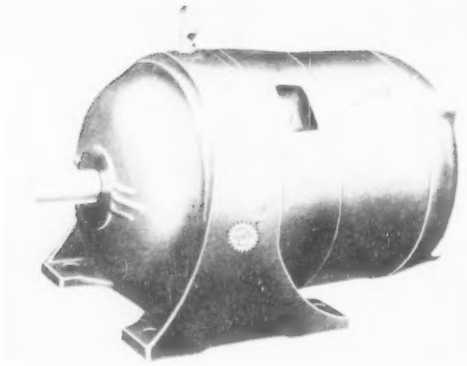
New compact spray dryer is easy to clean, simple to operate. Capacity: 2 to 7 tons per day....Page 110

Flexible stainless hose, made of "Super Alloy", provides full corrosion resistance.....Page 111

AND WATCH FOR . . .

Portable electric generator provides live dry steam for cleaning purposes.....In March FI

Air-operated device fills drums to correct weight, and simple operation is feature.....In March FI



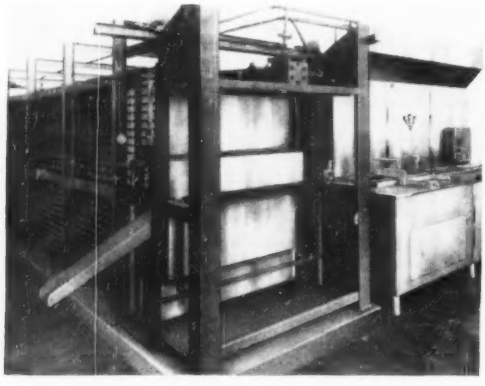
Gearmotors Are Quiet, Tough, Compact

High standards of performance with regard to load carrying capacity, wear life, quietness of operation and compactness of design, are featured in a new complete line of gearmotors.

Used in the units are hard helical gears and other moving parts which have been processed and heat treated under improved methods of manufacturing control.

New gearmotor, manufactured in 17 sizes, provides single, double, and triple reduction units having output speeds from 780 down to 7.5 rpm. Integral hp. ratings from 1 through 75 hp. are available for practically any industrial application.

A wide selection of motor enclosures is offered, including the conventional open drip-proof, splash-proof, totally enclosed and explosion-proof construction. Both a.c. and d.c. motors of all types, and those having special electrical characteristics, are available to meet unusual installation and application requirements.—*Foote Bros. Gear and Machine Corp., Chicago and/or The Louis Allis Co., Milwaukee.*



Quick Freezer Has High Capacity

A continuous quick freezer unit capable of handling 1-lb. packages of frozen food at the rate of 4,000 per hr., or hardening 8,000 pint packages of ice cream, has been developed.

All control circuits and mechanisms responsible for the automatic operation of the unit are located outside of the cold room. Moving parts necessary in cold room are hydraulic, insuring precise operation at all times. Cycle timing is electrically locked and operated by positive mechanical means.

When feeding conveyor belt has delivered 15 food packages, or 24 pints of ice cream, to loading table, packages are pushed onto push-carry belt, which delivers them to freezer tray shelf. In same operation, frozen packages are ejected from opposite side.

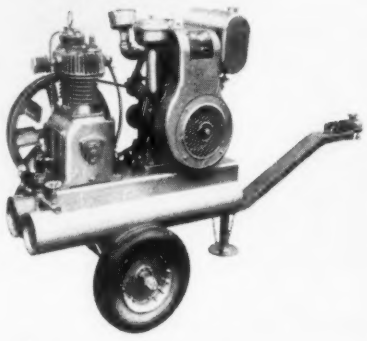
Packaged freezer consists of a structural steel framework, uses 80 aluminum freezer trays, with 12 shelves 5 ft. wide. The ice cream quick hardener uses 50 trays with 7 shelves 5 ft. wide. Freezer tray never leaves cold room. Since only packaged food or ice cream enters and leaves cold room, there is no chance for frost or ice to build up on trays.

After a shelf is loaded, tray indexes up one position and is ready to receive the next charge of packages. When freezer tray is loaded, it is automatically pushed into the low-temperature, high-velocity air blast.

Freezer room handles 14,600 food packages at one time and freezing cycle is approximately $3\frac{3}{4}$ hr. Capacity for ice cream is 8,400 pint packages, and hardening cycle takes 1 hr. Tray travels on upper level to rear of freezer room and then is automatically dropped to lower track to complete cycle.

Cold air is circulated over packages by four axial-flow fans that blow returning air over evaporators across coldest packages on lower track and up over top trays. In this way, coldest air flows counter to package direction. Refrigeration circuits are arranged for fast defrosting of evaporators.

Compactly designed apparatus is called Freez-Pak. Space required for a machine of 4,000-lb.-per-hr. capacity is 22 ft. long, 19 ft. wide, and 8 ft. 9 in. high. Unit can be designed for smaller capacity.—*Freezing Equipment Sales, Inc., 415 W. Market St., York, Pa.*



Trailer Compressors Are Easy to Handle

For operating small air tools on miscellaneous service jobs, a new line of easily handled trailer-mounted portable compressors has been developed.

Their capacity is ample for operating paint spray guns, chipping hammers, light paving breakers, spaders, tampers and similar pneumatic equipment.

Trailer-mounted units are furnished complete—having the air-cooled compressor, with V-belt drive to gasoline engine, mounted on a sturdy pipe tank type base. Unit is equipped with semi-pneumatic rubber tired roller bearing wheels, drawbar, trailer hitch and stabilizer leg. It can be readily towed behind a car or service truck.—*Gardner Denver Co., Quincy, Ill.*

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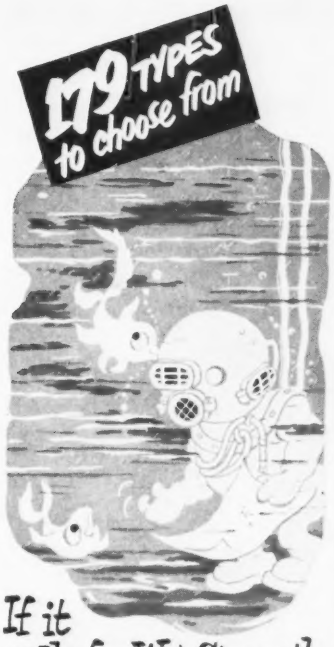

If it calls for Wet-Strength Patapar can help you

Patapar Vegetable Parchment is famous for its wet-strength. Soak it, drench it—even boil it. Patapar comes out strong and glistening.

But wet-strength is just one of Patapar's qualities. This unique paper is produced in 179 different types. Each type has special qualities to meet special problems.

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Some of its uses

Patapar is wonderful as a wrapper for protecting foods like butter, bacon, fish, cheese, margarine, poultry. It is used for making lampshades, beautiful greeting cards, for rubber mold liners, putty wrappers, artists' sketching pads.

For more information write on your business letterhead for booklet T, "The Story of Patapar."

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Windsor, Canada

New Truck Line Includes Model for Every Task

Now available to food field operators is the new "Model L" International truck line of 87 separate models. To meet every highway transportation need in road speeds and load-carrying capacities and to provide a cheaper cost of operation, the new trucks have been completely redesigned from stem to stern at a production changeover cost in excess of $30,000,000.

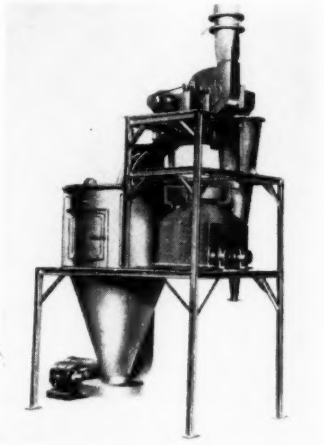
The 87 model line includes two-axle jobs with gross vehicle weights from 4,200 to 40,000 lb.; new Metro step-in drive models from 5,300 to 10,000 lb.; six 3-axle jobs from 22,000 to 50,000 lb.; five bus models from 12,000 to 24,000 lb.; and two highway and four off-highway models ranging from 30,000 to 90,000 lb.

The new line was road-tested for more than 3,000,000 mi. over a three year period. And there was required a major revamping of many of the company's plants.

Among the new engineering features designed to reduce operating costs are new valve-in-head engines to provide more power at less fuel consumption; also shorter wheelbases with a re-apportioning of the engine location, hood, cowl and cab length, and axle positioning to give a shorter turning radius and a greater load capacity by putting more weight on the traditionally-underloaded front axle.

Chassis and cabs are furnished in four standard colors, with an option of six additional colors, at no extra cost, to eliminate the necessity for repainting after delivery. An entirely new cab with a full-width curved windshield, more accessories, and plasticized upholstery, provides greater driver comfort, more road vision, and better cleanliness, since the plasticized covering resists the absorption of stains and wipes clean with a damp cloth.

Other detailed engineering refinements designed for lower mechanical operating costs include longer-wearing Stellite-faced valves and Durachrome heat-treated valve inserts; a more efficient crankcase ventilating system; more economical oil consumption; and deep-well tappet fittings.—*International Harvester Co., 180 No. Michigan Ave., Chicago* 1.



New Compact Spray Dryer Is Simple to Operate

For moderate production and pilot plant operation, a new spray drying unit with a capacity of two to seven tons per day has been announced.

The No. 2 spray dryer is extremely compact, occupying a floor space 10 x 15 ft. with over-all headroom of 23 ft. Dryer was designed to minimize installation difficulty. Chamber is shipped as an assembled unit, while structural steel framework is sectionally shop-welded and requires bolting in but six sections.

Unit is easy to clean, simple to operate, and is reported to be relatively inexpensive. It has all the main elements of high tonnage spray dryers, consisting essentially of a heater, drying chamber with high-speed spray machine, collection system, and fan. Unit is instrument-equipped for simplified semi-automatic operation. It

Bath Won't "Boil Dry"

This new portable water bath, weighing only 24 lb., accommodates a variety of glassware. A special bottle-feed device prevents bath from "boiling dry" for as long as 10 hr. on low and 5 hr. on high heat.—*Fischer Scientific Co., 717 Forbes St., Pittsburgh, Pa.*

contains recording instruments for inlet and outlet temperatures. Instruments control over- and inlet-temperatures. Heat-sensitive materials can be "shock-cooled" by admitting cooling air through side air inlets.—*Bowen Engineering, Inc., 100 Station Rd., North Branch, N. J.*

Flexible Stainless Hose Made of "Super Alloy"

For use where full corrosion resistance must be combined with flexibility, on equipment which vibrates or must be moved from time to time, flexible stainless-steel hose is now being produced commercially in a highly corrosion-resistant alloy. It is known as Carpenter Stainless No. 20.

Hose, made from No. 20, ranges in size from 1 to 2⅝ in. i.d., in various gages. Shown in photograph above

GENERAL MILLS

TRAY-LOCK MACHINE

and Finished Edge Carton Former

now made and sold by

"PACKAGE"

The acquisition of the General Mills Tray-Lock machine and the Finished Edge Carton Former place "PACKAGE" in a better position than ever to render the broadest possible service to package goods manufacturers. These machines, together with our Palmer General Purpose Carton Former, were originally developed by F. D. Palmer and are meeting the packaging requirements of a wide variety of products.

LOWER COSTS

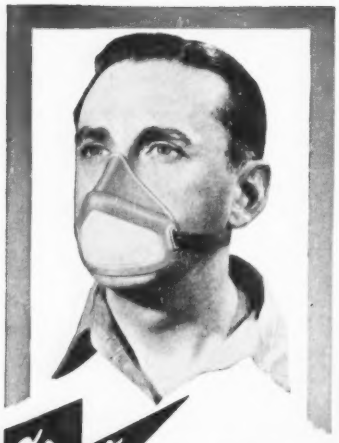
The savings they make on material costs and labor are truly striking. *A machine often pays for itself in a matter of months.*

THE TRAY-LOCK machine sets up lock-type trays and cartons from die-cut board in a wide variety of styles, including hinge-cover and display-top cartons. THE FINISHED EDGE CARTON FORMER, using flat die-cut board, sets up open top double-wall trays or cartons. All four edges are finished. They may be used as is or as tops and bottoms of telescope boxes. Trays and cartons require no gluing, and both machines handle a wide range of sizes. Speeds of up to 90 cartons per minute are possible with either machine. One person can feed a number of machines.

Write for complete information

PACKAGE MACHINERY COMPANY
PALMER DIVISION
SPRINGFIELD, MASSACHUSETTS

NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.



New **FLEX-A-FOAM FILTER MASK**

DUST PROTECTION YOUR WORKERS WELCOME AND *WEAR*

No respirator does any good unless workers will wear it. Even if your men won't use old-fashioned respirators—cumbersome, grotesque, stifling—they're glad to wear the new Flex-a-Foam Filter Mask. Here's why:

- ***It's a featherweight—only 1 ounce.***
- ***It's snug and comfortable—adjusts to any face size.***
- ***It's easier to breathe and talk through than a linen handkerchief.***
- ***It's smartly styled—workers don't look or feel peculiar.***

FLEX-A-FOAM'S filter is a honeycomb of whipped foam latex that *keeps out non-toxic nuisance dusts as small as 1/25,000 of an inch!* Frames are of new DuPont Polythene plastic—so flexible they adjust themselves to any facial contours, yet so tough they're unbreakable in normal usage.

For new comfort, new efficiency—new economy, too—order Flex-a-Foam Filter Masks—lowest priced *quality* respirator on the market.

ATTENTION AGENTS AND JOBBERS
Your interest is invited

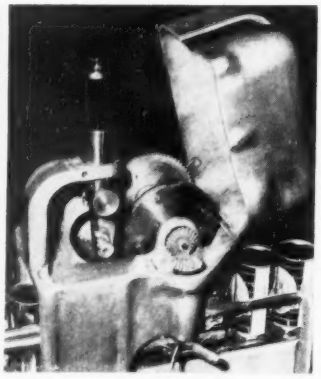
The Goggle Parts Company — Dept. C.
Cleveland 13, Ohio
Please send full information and prices on Flex-a-Foam Filter Masks.

Name_____
Position_____
Company_____
Address_____
City_____ Zone_____ State_____

THE GOGGLE PARTS COMPANY
CLEVELAND 13, OHIO

is 1½ i.d. by .025 in. thick wall hose. New alloy provides excellent corrosion resistance in sulphonation and other processes which cause the formation of sulphuric, formic or acetic acids or other highly corrosive agents.

Fittings such as standard pipe-size nipples, etc., can be welded to ends of flexible hose, or hose ends can be provided in non-flexible standard tube sizes for use with flanges.—*Alloy Tube Div., The Carpenter Steel Co., Union, N. J.*



Marker Codes Cans At 600 Per Min.

Simplified marking equipment, for continuous coding of cans and other flat top containers on the conveyor line, has been introduced.

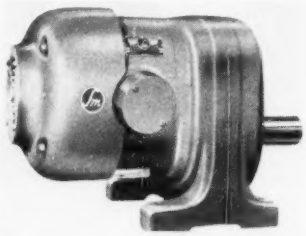
Any number of digits in single or multiple rows can be marked at speeds up to 600 per min.

In practice, marking speed is limited only by other equipment, since the movement of containers along conveyor line actuates marker. Containers rotate a pair of starwheels, which in turn actuate the stamping wheel and ink-metering pump (seen in photo, where hinged top has been lifted to show mechanism).

Ink flows only when containers are being marked, so there is no waste or spilled ink to clean up. On production runs, the total consumption of ink has averaged about 1 pt. a month.

Ink is fed to marking stamps through a pump and metering device from which it is transferred to an inking roll. A spreader wheel distributes it evenly before it is picked up by stamps. Ink dries immediately and is not affected by moisture on containers.

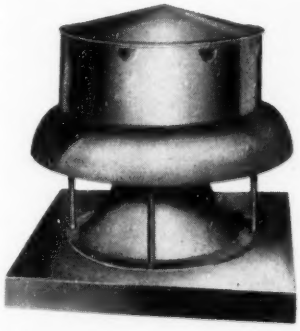
Installation of marker can be made at any convenient point on conveyor line, and usually takes no more than one hour. Machine is mounted on conveyor line by two flanges on each side, with bolts through conveyor frame. Live rubber shock-mounts provide automatic height adjustment for uniform printing. Large hinged aluminum cover permits easy lubrication, type changes, and ink adjustments.—*Bruce Engineering Corp., San Francisco and Pasadena.*



Gear-Type Electric Motor Now Totally Enclosed

Klosd-Tite construction is new improvement to "Slo-Speed" geared motors. These latest motors are intended for use in atmospheres containing non-explosive dusts and vapors.

An external fan forces cooling blasts of air over the streamlined case. Designated Type FWFB, totally enclosed motor includes such features as labyrinth seals, liberal heavy duty ball bearings lubricated for life, and the company's patented Herringbone rotor, with motor and gears combined in a balanced design from power intake to drive shaft. Motor can be mounted in any position without modification.—*Sterling Electric Motors, Inc., Los Angeles 22.*



Anti-"Blow Back" Exhauster

Explosive danger and corrosive action by moisture or chemical fumes are eliminated in this exhauster by having motor enclosed and out of air stream. To prevent "blow back", air is expelled downward onto roof. —*Gallaher Co., Omaha, Neb., and Owatonna, Minn.*

HEYDEN PRODUCTS

FOR ASSURED QUALITY IN FOODS

SODIUM BENZOATE U.S.P.

A standard preservative of food quality, flavor and color. Available as powder or flakes. Shipped in 100 lb. bbls.; 50 and 25 lb. fiber drums.

BENZALDEHYDE N.F.

Synthetic oil of bitter almonds. For flavoring and aroma in canned fruits, fruit beverages, cake mixes, candies. Shipped in 425 lb. drums, 100 lb. carboys, and 50 and 25 lb. boxed tins.

SACCHARIN

U.S.P. Powder and Saccharin Sodium U.S.P. Powder and Granular.

BENZOIC ACID

Widely used as a preserving agent. Shipped in 100 lb. bbls.; 50 and 25 lb. fiber drums.

METHYL SALICYLATE U.S.P.

Synthetic oil of wintergreen. For flavoring confectionery and beverages. Shipped in 500 lb. drums and 50 lb. tins.

PROPYL GALLATE

A powerful antioxidant serving as a stabilizer for edible oils and fats, emulsions, waxes, etc. Shipped in 200, 100, 50 and 25 lb. fiber drums.

HEYDEN
CHEMICAL CORPORATION
393 SEVENTH AVE., NEW YORK 1, N. Y.
CHICAGO 6 • PHILADELPHIA 3 • SAN FRANCISCO 11 • RUMFORD 16, R.I.

FINE HEYDEN CHEMICALS

Benzaldehyde • Benzoates • Benzyl Chloride • Bromides
Chlorinated Aromatics • Chlorobenzenes • Creosotes • 2,4-D • Formaldehyde
Formic Acid • Glycerophosphates • Guaiacols • Hexamethylenetetramine
Medicinal Colloids • Methylene Disalicylic Acid • Paraformaldehyde
Parahydroxybenzoates • Penicillin • Pentaerythritols • Propyl Gallate
Quadrafos • Salicylates • Salicylic Acid • Streptomycin

IT'S A CLARK ELECTRIC

Smooth!
Anti-friction bearings, spiral-bevel gears, low-pressure hydraulic system, hydraulic brakes virtually eliminate vibration and wear.
Sturdy!
Completely-welded steel-plate frames, rolled-steel uprights, automotive-type drive and steering axles for durability.
Dependable!
Built-in strength plus GE's renowned dust- and moisture-tight motors keep CLARK Electrics in service.
Economical!
Low first cost, elimination of useless dead weight, negligible maintenance costs mean DOLLAR SAVINGS to the user.

AND WHERE PROPERLY EMPLOYED, IT'S A MONEY-SAVER . . . . .

Profitwise, it makes no difference to CLARK whether you choose electric-powered or gas-powered fork-lift trucks; CLARK builds a complete line of *both*. But profitwise, it makes an important difference to *you*.

The benefits to be gained from mechanizing your materials handling are sure to be considerable under any circumstance, but they can be maximum *only* when you use equipment that is *exactly right* for your particular operation. By determining *before you buy* which power type is better for your plant, you'll be money ahead . . . and more money ahead, of course, for buying that proper power type in the CLARK line.

You can CONSULT CLARK with assurance of getting completely impartial advice about your specific needs; advice backed by unrivalled experience in modern materials handling methods, and by machines that are acknowledged leaders in their field.

It will pay you to call the CLARK dealer. There's one near you, and he's equipped to give you thoroughly dependable help. It costs nothing to CONSULT CLARK and it doesn't obligate you in any way.

For a copy of Material Handling News and information about CLARK movies (invaluable guides to the best in materials handling methods and machines) write direct to CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 14, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Handles Corrosive Liquids

This rubber pinch valve is employed in pipe lines carrying corrosive slurries and liquids difficult to handle or injurious to metal valves. It is comprised of three essential parts: Rubber tube, pinching mechanism, and housing. It closes easily and positively.—*Ray Wilcox Co., 1436-37 Land Title Bldg., Philadelphia 10.*

Equipment Briefs

Chlorine Feeder

Development of a new gas feeder designed to meter chlorine gas and produce chlorine water solutions is announced. "Chlorimizer" is readily adapted to semi-automatic, program, or automatic proportional operation. Conversion from one method of operation to any other may be made in the field.—*Builders Providence, Inc., Providence, 1, R. I.*

Silicone Compound

Heat sealing equipment is kept clean and free from build-up of melted plastics or wax when a silicone plastic is the release agent. It is designed to make the heat sealing of plastic films, waxed paper and moisture-proofed cellophane easier and more efficient.—*Dow Corning Corp., Midland, Mich.*

Pinch Valves

Three new lines of pinch valves have been announced. They comprise: the Slip On Type 7100 in sizes ½- to 2½-in.; Flanged End Type 7200 in sizes 1- to 12-in.; and Diaphragm Motor Type in sizes 1- to 10-in. They are highly resistant to abrasives and to those corrosives not affecting rubber, Neoprene, Buna N and Butyl.—*Flexible Valve Corp., Palisades Park, N. J.*

Electronic Counter

Versatility, speed and accuracy are combined in a newly developed counting machine, which is suitable for such products as candy or tablets. Units are built for either completely automatic or hand feeding.—*U. S. Engineering Co., 140 Nassau St., New York City 7.*

Protective Resin

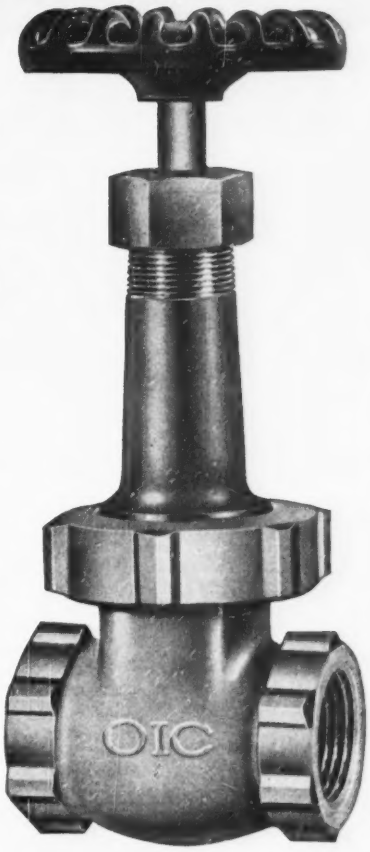
Newly developed resin, for lining wooden tanks and protecting concrete floors, provides resistance to acids, alkalis, and solvents at the higher temperatures. It is also capable of withstanding abrasion.—*Carboline Co., 7603 Forsyth Blvd., St. Louis 5.*

—End

OIC UNION BONNET BRONZE GATE VALVE

GIVES YOU MONEY-SAVING FEATURES YOU'LL WELCOME

This series of OIC valves (Figure nos. 7200, 7202 and 7208) is rated for working pressures of 200 pounds steam at 550°F.—400 pounds water, oil and gas, non-shock. Union bonnet screwed-end type. Solid wedge rising stem, double-disc rising stem and solid wedge non-rising stem designs. Tapered seats and wedges of OIC copper nickel alloy. You'll find this new valve a money-saver on water, oil, gas, steam or any other service where bronze gate valves are used.



LONGER LIFE—LOWER COST

Scientifically designed, constructed of highest quality materials, accurately machined and thoroughly tested for trouble-free operation.

EASILY SERVICED—LOWER MAINTENANCE

Easy to dismantle and reassemble. Quick inspection and servicing. Easy repacking.

EASIER OPERATION—SAVES TIME

Perfect seating without binding or undue wear. Straight-through flow. Minimum pressure drop.

STRONGER—GREATER SAFETY

Ample wall thicknesses. No dangerous stress concentrations. Leak-proof joints.

OIC
PACE SETTER IN VALVES

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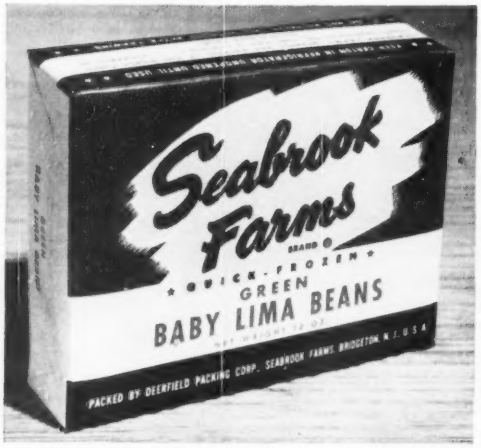
SPECIAL INTRODUCTORY OFFER

If you'd like to check this OIC bronze 200 lb. union bonnet gate valve, simply send us the size and we'll deliver you a sample on memo billing. Inspect it, analyze it, take it apart, test it. At the end of 30 days, if you're not convinced of its superiority over any comparable valve you've ever used, return it for full credit.

THE OHIO INJECTOR CO.
270 MAIN ST. WADSWORTH, OHIO

BRONZE • IRON • CAST STEEL • FORGED STEEL

New Packages and Products



Out goes the old . . .

. . . in comes the new

Special Overwrap Steps Up Output—Sales, Too

Appetite appeal, prominent brand and product identification, plus a 50 percent speed up in rate of packaging, has been achieved by Seabrook Farms Co., Bridgeton, N. J., with the adoption of new overwrap labels for its line of quick-frozen fruits and vegetables.

Direct color photos of the products realistically illustrate contents of each box. And these reproductions are carried completely around the carton—to be easily seen no matter what the position of the box. Extensive use of white space on the label complements the attractive fruit and vegetable pictures to give them the appearance of being placed on a porcelain counter top. The characteristic Seabrook Farms trademark stands in blue against a yellow background.

The overwrap is treated with a special wax-and-polyethylene coating that has the advantage of quick heat-sealing. In fact, wrapping rate is now 110 boxes per min.—in contrast with the former speed of 75.

Cartons are of wet-strength white sulphite paperboard wax-coated to resist moisture. Supplied to Seabrook in flat form, they are fed from a magazine into machines for automatic forming, filling, closing and overwrapping.

Reverse side of the label includes a proven recipe employing the product. Six different recipes are used for each individual product, so that the housewife may select a package with a particular recipe one day and have five other choices on succeeding visits to the store.

Marathon Corp., Menasha, Wis., manufactures the labels and cartons. (Seabrook Farms photo)

Wine In Take-Home Glasses

A novel ready-to-serve item—wine sealed in wine glasses—has been introduced by the Roma Wine Co., Fresno, Calif.

Six types—port, sherry, muscatel, burgundy, sauterne and claret—are offered in the 3-oz., footed, wine tumblers. A metal, vacuum-tight cap, which can be easily flicked off, seals the beverage until the user is ready to remove the tiny label and serve. And glass is "correct for occasion."

This type of package is considered to be a "natural" for the housewife. It enables her to acquire a set of attractive, all-purpose glasses. Moreover, it offers many merchandising advantages to bars and restaurants. These outlets can suggest that the customer take home the glass, free.

More than a year was expended in perfecting the package. The Roma firm developed the glass in conjunction with the Glass Container Corp. and the White Cap Co.

New Package Developed for Lard

A new carton, named Wonder White, has been developed for packaging lard. The maker is Marathon Corp., Menasha, Wis.

The carton, specially treated to resist stain and grease penetration, is made of strong, solid-bleached paperboard base stock suitable for operation on the Peters automatic machine. In addition, its white brightness gives it a clean, attractive appearance for greater sales appeal.

YOU'LL BE *Dollars Ahead* with MACK DIESELS

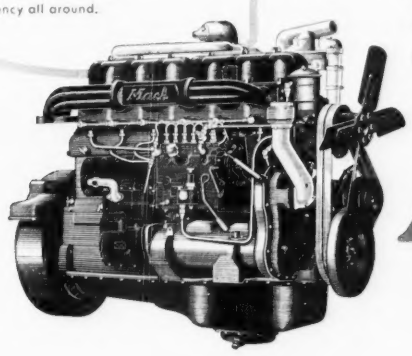
...CUT COSTS
...BOOST PROFITS
in Over-the-Road Hauling

MACK BUILDS BETTER DIESELS...because Mack has better know-how

Twenty-two years of diesel development stand back of every Mack diesel engine.

More diesel-powered trucks have been produced by Mack than by any other manufacturer – over 15,000 alone for wartime service.

Remember, too, Mack diesel engines give you this further advantage: they're the only diesels designed specifically for a single line of trucks . . . Mack trucks. That's assurance of complete co-ordination of both engine and chassis . . . maximum efficiency all around.



● It will pay you to investigate the savings secured with Mack diesels – especially if you roll up big mileage in long-haul tractor-trailer service in the 40,000 to 73,000 g.c.w. range.*

You'll find there's big economy all around with Mack diesel-powered trucks . . . owners report 75% more miles per gallon – at less cost per gallon! And you get all the advantages of Mack's advanced and exclusive diesel design – outstanding performance; longer, more dependable life; minimum maintenance.

Your nearest Mack branch or dealer will tell you how Mack diesels fit in with your particular hauling conditions. You will get fair, unbiased advice – ***because only Mack offers such a complete line of both diesel and gasoline-powered trucks.***

*This means there is a Mack diesel-powered unit to meet legal limits of any state.

Mack TRUCKS

GASOLINE or DIESEL POWERED

Mack Trucks, Inc., Empire State Bldg., New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Announcing the entirely new HYSTER 20

better in every way...

- **NEW** improved Wisconsin *Air Cooled Engine*. Efficient in *any temperature*, high or low. Greater H.P. than other 2000 pound trucks. Power to spare yet *cheaper to run*.
- **NEW**, long life, heavy duty Borg & Beck *Clutch*. Smooth as your automobile clutch. Estimated life over 2 times greater than other trucks. *It can be replaced in less than two hours*.
- **PNEUMATIC TIRES** — Big diameter, 10-ply rating (6.00x9).
- **SINGLE LEVER CONTROL** — one lever for hoisting, tilting.
- **LOW OVERALL HEIGHT** — truck with 9-foot lift only 78½ inches high. Other lift heights available.
- **EXTREMELY LOW OPERATING COSTS**. Almost 100 *new* mechanical improvements.

...Now on display at Hyster Distributors in all principal cities

HYSTER®
COMPANY
THREE FACTORIES
2902-35 N. E. Clackamas, Portland 8, Ore.
1802-35 North Adams... Peoria 1, Illinois
1010-35 Meyers Street... Danville, Illinois

the first completely modern 2000 pound Lift Truck

Designed by Materials Handling Engineers. Priced right, low maintenance costs, standardized repair procedures, low depreciation.

Operates equally as well inside or outside your plant. Low center of gravity, better visibility; EASIER ON FLOOR SURFACES, THE OPERATOR, AND ON LOADS.

THOUSANDS of HYSTER 20 trucks are in use in HUNDREDS of INDUSTRIES. NOW the New Hyster 20 Lift Truck can cut materials handling costs even more. SEE IT at your nearest HYSTER DISTRIBUTOR. While you are there, inspect his SERVICE facilities.

New Sweet-Coated Cereal

Now being testmarketed in a few select areas is a new product of the Post Division of General Foods Corp. —Post's Sugar Crisp.

Packed in transparent cellulose film, this foodstuff is a puffed wheat cereal coated with sugar and honey. It is sufficiently sweet when served as a breakfast cereal that it does not require addition of sugar.

In addition to use as a breakfast food, the new item has a potential market as a confection.

New Pack of Frozen Steaks

Fast-frozen tenderized steaks recently made their debut in Akron. Produced by Grand Duchess Steaks, Inc., the meat is prepared by a patented tenderizing process.

The steaks are specially processed to eliminate tough fibers and to preserve nutrients and juices. Maker states that the fast-freezing in laminated paper cartons locks in the flavor and that air-tight sealing in the Pliofilm overwrap protects against dehydration.

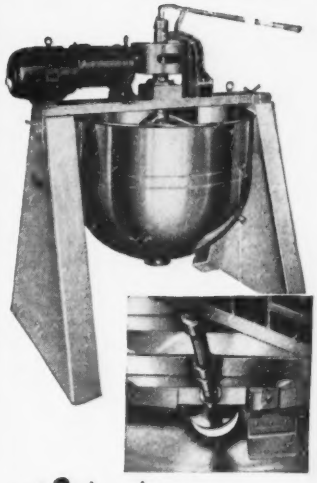
Each carton weighs 15 oz. and contains 5 steaks. Instructions on the pack state that thawing is unnecessary and that the meat is simply prepared by cooking 1½ min. on each side.

The producer is now offering to license producer-distributors throughout the country. Akron Standard Meat Co. is exclusive distributor for the Akron area.

It's "Cold Concentrated"

Full-flavored, fresh-frozen, concentrated juice of northern-grown Michigan apples—prepared by a new process of "cold concentration"—is now being introduced in the midwest by Cherry Growers, Inc., Traverse City, Mich.

Tradenamed Apco, the drink is offered in standard 6-oz. cans. Juice is reported to have the natural taste and aroma of apples because there is no boiling of any kind during its pro-



POP the valve open...
POP the valve shut...
and this agitator keeps mixing all the while... DOUBLE MOTION!
(Valve diameter up to 6")

It's the newest in kettles...

The HAMILTON
Roto-Speed "MIX-COOKER"!

We believe it to be the finest steam-jacketed kettle for products which tend to settle or choke up. Cooks fast. Mixes thoroughly. Empties fast and clean. Operates at a touch. We'd like to tell you all about this "MIX-COOKER" for "problem products." Users are happy!

Write for complete Hamilton Kettle Catalog

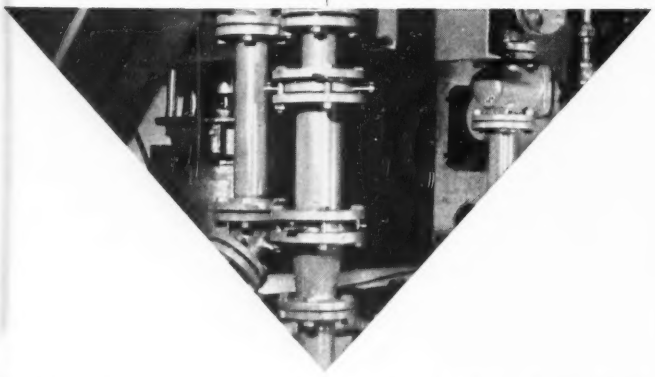
HAMILTON
COPPER & BRASS WORKS, INC.
HAMILTON, OHIO

one of the
ALVIN HOCK INDUSTRIES

SARAN
LINED
steel
pipe

available immediately ✳ readily field fabricated

resists corrosion



Saran's unusual resistance to most corrosive chemicals and solvents plays an important part in the reduction of shutdowns and lost production! Saves time and labor!

Saran lined steel pipe is available in maximum lengths of 10 feet and in sizes from 1 to 6 inches inclusive. Also available are saran lined plug valves, Saunders type diaphragm valves, flanges, reducing flanges, flanged fittings, gaskets and fittings with union ends.

Write us today for further information concerning saran lined steel pipe and how it may help solve your production problems. Manufactured by The Dow Chemical Company, Bay City, Michigan, distributed nationally by Saran Lined Pipe Company.

Saran Lined Pipe Company
701 STEPHENSON BUILDING • DETROIT, MICHIGAN
Offices in: New York • Boston • Philadelphia • Pittsburgh
Chicago • Tulsa • Indianapolis • Houston • San Francisco
Los Angeles • Portland • Cleveland • Denver • Seattle
Charleston, S. C. • Toronto

another
DOW
product

duction. Immediately after pressing, the juice is cooled to the freezing point of water, and from then on in the process, temperature rises no higher.

Production is conducted according to the patented technics of the "Noyes Processes", whereby a frozen mass gets controlled additions of heat, at temperatures below 32 deg. F., to yield a fully-flavored concentrate and leave the water behind as ice.

The container is attractively lithographed in red, white, blue, green and yellow.

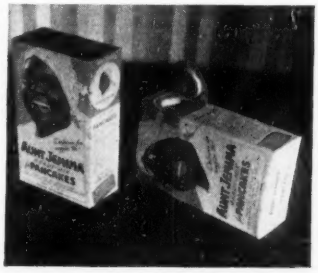
Cowboy Candy Bar

Named after a popular movie cowboy and television hero—H. Cassidy—a new 5¢ candy bar has been introduced by Ryan Candy Co., Ltd., New York City.

The bar is described as an enriched chocolate coconut candy, since it contains added vitamins.

The wrapper carries a sketch of William Boyd, long identified with the Hopalong Cassidy role. And as an extra merchandising twist, each wrap carries a premium coupon.

Originally introduced along the Atlantic Seaboard, the bar is to be distributed nationally, according to latest plans. It will be manufactured on a contract basis for the Ryan group at plants located throughout the country.



"Pour-Hole" Carton

For easier opening and pouring, the new Aunt Jemima pancake flour package features a built-in mix-dispensing

HERE'S MOTOR REPAIR SERVICE

THAT WILL SAVE YOU MONEY!

A-C Certified Service Shops, like Cincinnati Electric Equipment Company shown, have modern equipment and expert personnel for fast emergency service . . . for routine maintenance and repair that keeps your production rolling smoothly.

WHEREVER YOU ARE, there is a nearby Allis-Chalmers Certified Service Shop to keep your motors and other electrical equipment running smoothly. These independent shops are selected after careful investigation for their up-to-date equipment, experienced personnel, good business practices and will to serve. They use only factory-approved parts and methods.

When you need repairs or maintenance on motors and other electrical equipment, depend on Allis-Chalmers Certified Service. Write for a list of the Certified Service Shops near you.

For New Motors and Control . . .

No one knows more about correct motor and starter application than your A-C Certified Service Shop. When you need new motors or starters, check with the one in your area or with your nearest A-C Sales Office.

ALLIS-CHALMERS, 1113A SO. 70 ST. MILWAUKEE, WIS. A-2935

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

Finer food FLAVOR for greater food SALES

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Mono Sodium Glutamate

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Hydrolyzed Vegetable Proteins

HURON, the pioneer in the commercial development of MonoSodium Glutamate in this country, has been supplying food manufacturers since 1934. HURON Specialists work with food manufacturers and have a PRACTICAL knowledge, based on years of experience in the application of these products, their properties, and correct usage. This HURON know-how is ALL IMPORTANT to you . . . here is one example of the wide range of information HURON can give you:

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THE HURON MILLING COMPANY

9 Park Place, New York 7, N.Y.

"pour-hole," complete with attached re-closure lid (see photo).

Engineers of the Quaker Oats Co., Akron, Ohio, designed the novel container and also the machinery to produce it.

A hole is first stamped in the carton blank. Next, a paper closure is machine forced into this hole and then sealed in place with an overwrap. The carton is then filled through the top, in the usual manner, and closed.

A printed arrow on the front of the box indicates where the consumer can lift the new closure lid. Mix is readily emptied from the hole. And when only part of the flour is used, the box can be tightly shut again by pressing the lid back into the opening.

New Milk Bottle Developed

Lower initial cost, lighter weight, and greater durability are features attributed to the "Mini Half-Pint" glass bottle introduced by The Buck Glass Co., Baltimore, Md.

This new container is designed to absorb stresses and strains instead of resisting them. Excess dead-weight glass is reported eliminated without sacrificing any useful features of the bottle. The required contour for closure requirements is maintained, yet the total weight of the bottle has been reduced 50 percent.

The conventional heavy bumper ring has been replaced with a specially designed shoulder to act as a guide for capping machines and a stop on the washing machine pockets. This feature also is stated to make possible a uniformly light weight distribution from top of the bottle to the bottom. Accordingly, the new bottle is less top heavy than the old ones.

Production is presently limited to the half-pint size. —*End*

Life expectancy dictates JENKINS VALVES *for the new John Hancock Building*

Architects: CRAM & FERGUSON, Boston, Mass.

Builders: TURNER CONSTRUCTION CO., Boston, Mass.

Contractors for Heating, Ventilating, and Air Conditioning
BUERKEL & CO., INC., Boston, Mass.

FROM TELEVISION MAST to sidewalk snow-melting system, the new John Hancock Mutual Life Insurance Company Building has been skillfully planned for operating efficiency and economy, now, and in the years to come.

All equipment was chosen with an eye to the future—*future maintenance and operating costs.* It was on this basis that Jenkins Valves were selected.

Leading architects, engineers, and contractors have specified Jenkins Valves for the nation's most efficiently planned and operated buildings and plants for over 85 years. First, because they know that Jenkins builds extra endurance into valves—proved by long life and low upkeep cost records in every type of service. Second, because they know the value of the unequalled experience Jenkins Engineers can apply to any question of selection, installation, or maintenance.

Take the long view on valve economy . . . for new installations, for replacements, rely on Jenkins Valves for lowest costs in the long run. *Sold through leading Industrial Distributors everywhere.*

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VALVES
SINCE 1864
TRADE JENKINS MARK

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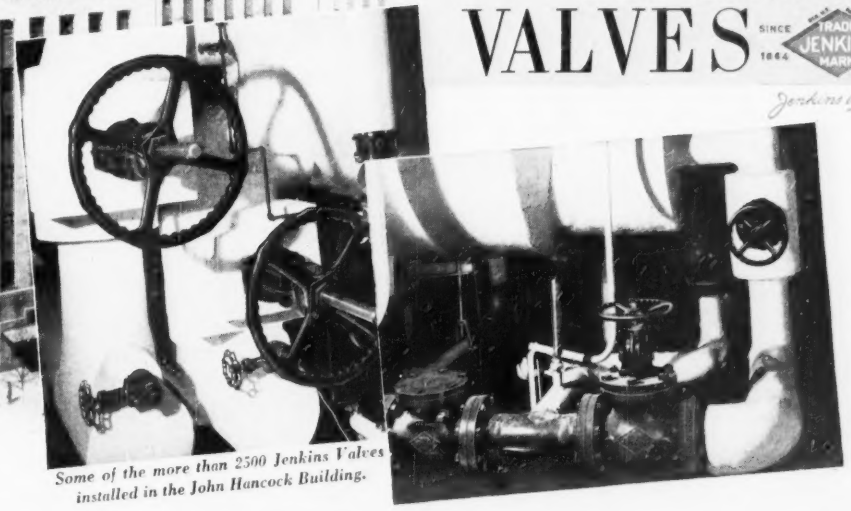

Some of the more than 2500 Jenkins Valves installed in the John Hancock Building.

One of a Series Dedicated to the Nutritional Advances of the Food Industries

KEEPING FAITH WITH NATURE

MAKING A GOOD FOOD BETTER* . . . Nature provided corn with only small amounts of certain vitamins and other nutrients essential to human health. Degermed meal and grits unavoidably lose some of this precious nutritive value in milling. Fortunately these vital health-giving factors can now be restored (or increased in whole corn meal which is naturally low in niacin and iron) by the simple process of enrichment. By enriching corn, by "making a good food better," the millers help protect the health of a significant portion of our nation. Their achievement in making their products finer and nutritionally more beneficial is acclaimed by physicians and nutritionists. Corn millers are Keeping Faith With Nature.

*The title of a color film on the enrichment of corn meal and grits produced by Clemson Agricultural College. This film is widely recognized as an outstanding educational film on food and nutrition and is being shown by many health departments and schools.

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New Technology

Antioxidants Prolong the Shelf Life of Lard Especially When Moisture Content Is Low

Lard as well as other fats is generally presumed to keep better if the moisture content is low. With suitable blends of wet- and dry-rendered lards, samples were prepared containing 0.75 to 12.0 percent moisture, on which exact measurements of its effect and the behavior of added antioxidants, could be made. The stabilizers used were those permitted by the Canadian Food & Drugs Act for use in lard—guaiac, lecithin, citric acid, and alpha tocopherol.

Lard of zero moisture content can be prepared from commercial lard, which usually contains about 0.1 percent moisture, by heating under vacuum at 212 F. for about 3 hr., while stirring and agitating vigorously. As moisture is added, up to 12 percent, lard forms a stable emulsion at room temperature or below. Above 12 percent there is some separation of water.

Without antioxidants, moisture alone, below the 6 to 12 percent range, had very little effect on shelf life of lard stored at 90 F. Stabilizers were more effective on the dryer lards. An exception was gum guaiac, which had the same effect whether water was present or not.

At zero moisture, on samples made from a blend of the same wet- and dry-rendered lards, 0.02 percent gum guaiac gave a shelf life of 29 weeks at 90 F., compared to 4½ weeks for an untreated sample. With 0.2 percent lecithin the shelf life was 14 weeks.

With 1.6 percent moisture in the sample, the shelf life was 30 weeks for 0.02 percent gum guaiac, 8 weeks for 0.2 percent lecithin, and 3 weeks for an untreated control sample. Gum guaiac was generally the most effective antioxidant.

Digest from "The Effect of Added Water and Antioxidents on the Keeping Quality of Lard," by H. J. Lips, *Canadian Journal of Research*, Vol. 27F, 373-81, Oct. 1949.

In Cooking Oils They Up Potato Chip Life

Butylated hydroxyanisole is an effective antioxidant for vegetable oils, vegetable shortening, lard, and combinations of these, when used for cooking potato chips. And it possesses good "carry-through" properties. Its effectiveness is greatest in a mixture comprising 60-percent vegetable shortening and 40-percent lard, and least in cottonseed oil and combinations containing this oil.

A combination antioxidant, produced by adding small amounts of propyl gallate and citric acid to the hydroxyanisole, further increased the shelf life of the potato chips. No added gain was obtained when the amount of propyl gallate was increased above 0.006 percent of the fat.

Digest from "The Use of Antioxidants in Potato Chipping," by J. E. Magoffin and R. W. Benz, *The Journal of the American Oil Chemists' Society*, 687-90, Dec. 1949.

FERMENTATION

Brewing Customs In Europe

Beer brewing is always subject to local customs, climates, and raw materials that give the product a certain amount of individuality from country to country. In Great Britain, top fermentations at a temperature of 59-68 F. are the rule. The yeast used is rarely of a pure culture (in the sense of having been propagated from a single cell originally) and is a top yeast, *Saccharomyces cerevisiae*. In Continental Europe, bottom-fermented lager beer, fermented at 39-50 F. is the usual type. Pure culture yeast is the rule, and the bottom yeast, *Saccharomyces carlsbergensis* is the usual species.

Malt for the ale brews of Great Britain is germinated for 10-12 days; Continental lager malt is germinated 9-10 days. As a result, ale malt is better modified than lager malt and better adapted to the mild infusion process of mashing used in England. The permanently soluble nitrogen of ale malt is 38-45 percent; for lager malt, 33-38 percent.

Water used in British brewing contains more sulphates than Continental waters, and this, combined with the differences in malt and in mashing methods, yields a wort of about pH 5.0 compared to the pH of 5.3-5.5 of Continental worts. One result is that the British brewer can add hops at a higher rate without producing the harsh bitterness that results when worts of pH 5.5 or higher are hopped heavily.

Ale fermentations in Great Britain are pitched with about 1 lb. of liquid yeast per bbl. of wort of sp. gr. 1.040; lager worts receive about 1.8 lb. of liquid bottom yeast in Continental Europe. The differences between top and bottom yeast may be due chiefly to the temperatures of fermentation. Bottom yeasts ferment vigorously at top yeast temperatures and tend to lose their lager yeast qualities. At high temperatures, bottom yeasts attenuate a wort in about one-fifth the usual time and yield a beer of lower pH than normal, while giving a much larger crop of yeast than usual.

Digest from "Comparison Between British and Continental Brewing Fermentations" by E. Helm, *Journal of the Incorporated Brewers' Guild*, Vol. 35, 411-23, Nov. 1949.

QUALITY CONTROL

L-Ascorbic Acid and Isomers Separated by New Method

Promising results have been obtained in experiments with paper partition chromatography in the qualitative detection of l-ascorbic acid in the presence of its isomers and closely related dienols. Further work is being done in the hope of devising a quantitative method. Silver nitrate-ammonia mixture and indophenol dye were used as reagents for spraying the chromatograms. The dye solution gave immediate reaction with ascorbic acid and related substances which appeared as sharply defined colorless spots on the dark blue background.

Three solvent mixtures were found most suitable for separation of members of the series: Butanol-acetic acid, phenol-acetic acid, and a fraction of refluxed technical collidine, b.p. 172 C.

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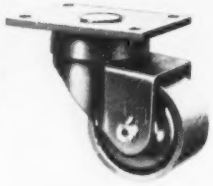
Darnell Casters



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The catalytic effect of copper was suppressed by irrigation of the chromatograms in the presence of a low concentration of HCN obtained by the addition of a small quantity of KCN to the aqueous solution in the bottom of the tank. Tabulated results of the tests show that greatest separations were obtained with the phenol-acetic acid mixture. The R_F values for that mixture were: Ascorbic acid 0.35, isoascorbic acid 0.40, hydroxytetronic acid 0.62, reductone 0.66, reductic acid 0.78, and dehydroascorbic acid 0.38.

Digest from "Separation of Substances Related to Ascorbic Acid," by L. W. Mapson and S. M. Partridge, *Nature*, Vol. 164, 479-80, Sept. 17, 1949.

DAIRY

Hydrolysis of Butterfat Produces Cheese Flavor

Cheddar cheese ripening is believed to be due, in part at least, to the lipolytic activity of the bacteria present in the curd during the ripening process. It has been suggested that all of the n-butyric, caproic, caprylic, and capric acids found in aged Cheddar cheese are due to the action of the bacterial lipase on the milk fat.

Of 54 Lactobacillus cultures isolated from cheeses, 12—7 from Cheddar and 5 from brick—were able to hydrolyze butterfat. Most cultures produced chiefly n-butyric acid, with lesser amounts of caproic, caprylic, and capric. Four of 8 cultures of Micrococcus from cheese were lipolytic but their activities were less than for Lactobacillus species.

While these strains produced lipolysis of butterfats it would be difficult to prove that they function in this way during cheese ripening. Their addition, in pure culture, to Cheddar cheese curd, followed by observations on the rate of ripening and the fatty acid content of the cheese would be necessary to establish their practical value.

Digest from "Delayed Hydrolysis of Butterfat by Certain Lactobacilli and Micrococci Isolated From Cheese," by M. H. Peterson and M. J. Johnson, *Journal of Bacteriology*, Vol. 58, 701-08, Nov. 1949.

Removal of Off-Flavors From Rancid Butter

Renovation of rancid butter so that it becomes palatable and loses its disagreeable odor is the object of a method outlined in a recent patent. The method comprises emulsifying the butterfat by mixing it, in the molten state, with skim milk powder to form a viscous dough-like mass. Hot water is added, with grinding, to produce an

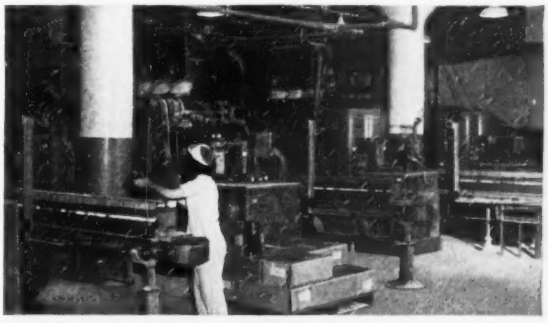
TO TOP PACKAGING EFFICIENCY

Yes, the leaders have found top packaging efficiency — and lower packaging costs — with Pneumatic machines!

Proof of that is the great prevalence of Pneumatic equipment in their plants — whether they are makers of soap, pharmaceuticals, foods, liquors or dozens of other packaged or bottled products. One thing they know, and have proved beyond question — Pneumatic machines do the job speedily, smoothly, efficiently — at "lower cost per container."

The whys and wherefores of Pneumatic's superior design and construction are many — and impressive. You will want to be familiar with them before you invest in packaging equipment.

Pneumatic's high speed packaging equipment at Baltimore plant of Lever Bros.



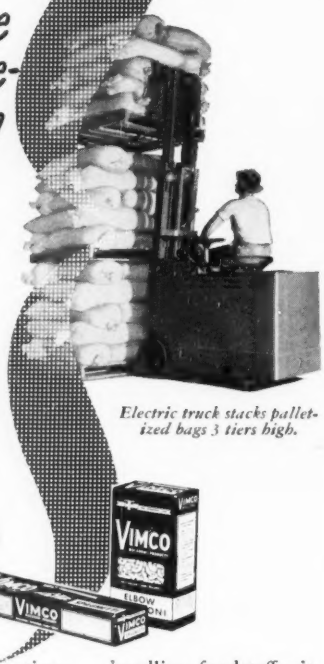
PNEUMATIC SCALE CORPORATION, LTD., 91 Newport Ave., Quincy 71, Mass. Branch Offices in New York, New York; Chicago, Illinois; San Francisco and Los Angeles, California; Seattle, Washington.

PNEUMATIC **PACKAGING AND BOTTLING MACHINERY**

One Battery-Powered Truck

Triples warehouse capacity with one-third reduction in floor area!

Saves $1.00 per ton in unloading and storing . . . Provides contamination-free handling for VIMCO MACARONI PRODUCTS COMPANY



Electric truck stacks palletized bags 3 tiers high.

The entire production program of Vimco Macaroni Products Company at Carnegie, Pa., is now geared to the speedy and efficient work of *one* electric industrial truck. By tiering pallet loads of raw material three-high, useful storage space was tripled, production space was increased, and need for a new warehouse was eliminated.

Two men and a battery-powered truck unload an 80,000 lb. car of sacked semolina in four hours. A saving of $46.00 per car totals almost $1,500 per month *in car-unloading alone.*

Used in loading and unloading, storing, production movement and maintenance work, this one truck *must* be available at all times . . handling foodstuffs, it must be fume-free. Mr. Samuel T. Viviano, Secretary and Treasurer of the Company, says, "A battery truck is the only powered machine that will give us this type of service. We have come to rely on the work done by this truck to such an extent that we couldn't operate without it."

Another example of electric truck *dependability* and *cleanliness* helping industry—while providing material handling *at lowest cost per unit moved.* This criterion, rather than initial investment, explains why so many industries prefer battery-powered trucks!

THE ELECTRIC INDUSTRIAL TRUCK ASSOCIATION
3701 NORTH BROAD STREET, PHILADELPHIA 40, PENNA.

emulsion containing 30-40 percent fat. This is cooled and churned until the fat is agglomerated. Butter is then separated from adhering liquid. In some instances it is necessary to repeat the operation in order to eliminate all rancid characteristics.

Digest from U. S. Patent 2,485,308, issued Oct. 18, 1949, on an application dated Sept. 20, 1946, to C. E. North, Montclair, N. J.

BAKING

Baking Changes Are Visible In Special Micro-Oven

Changes taking place during baking can now be followed by using an electrically heated micro-oven. Photomicrographs can be made as the baking proceeds.

The micro-oven consists of a slide held between a pair of hinged brass plates carrying heating elements, and recessed to hold a slide or cover slip. Pyrex glass windows permit light to pass through the baking preparation into the microscope objective.

Preparations are made by dotting a cover slip with a little dough from a spatula, or by spinning the cover slip with a drop of batter on it, so that a film is produced by centrifugal action. Stains for starch, fats, or protein components may be added to the dough before mixing.

Changes in gluten structure that occur between mixing, proofing and baking of bread are readily followed or photographed in the micro-oven. In cake batters, the dispersal and behavior of fats can be followed, and the point at which the oil globules of an emulsion tend to coalesce with rising temperature is easily seen. Construction of the micro-oven is relatively simple. Its value for study of bread, cracker, and cake-baking should be considerable.

Digest from "An Introduction to the Micro-oven Technique as Applied to Bakery Research," by R. C. A. Bradshaw and J. B. M. Coppock, *Journal of the Society of Chemical Industry*, Vol. 68, 234-37, Aug. 1949.

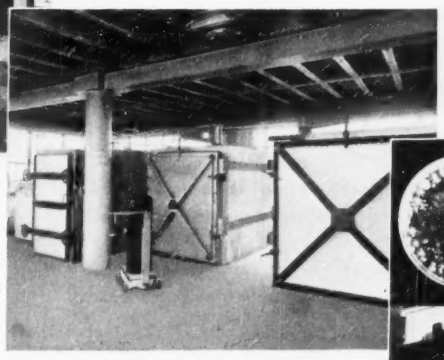
Polyoxyethylene Stearate Retards Bread Staling

Using samples of bread made from flour, water, yeast and salt, plus 0.5-1.0 percent polyoxyethylene emulsifier, tests were made for volume, texture, softness, crumbliness and taste. Flours used included: (1) Government, of 85 percent extraction and 20 percent rye or maize; (2) Imported hard wheat, 80 percent extraction; (3) "W" flour containing 10 percent farina; (4) Short extraction "home-grown" patent, and (5) pre-war standard, 70 percent extraction, made from 65 percent

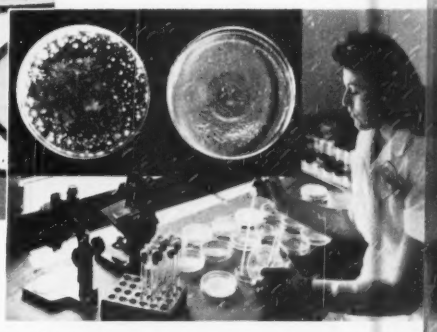
HOW GRIFFITH ASSURES *Perfect Flavor-Balance* IN YOUR SEASONING FORMULA

Delicious, Distinctive Flavor-Purity Safeguarded *Before* and *After* Blending!

The prime quality spices which Griffith imports are passed by the Department of Agriculture. Yet, here they are re-cleaned before being ground and purified.



In these huge retorts, spices are "decontaminated" by Griffith's exclusive Sterilization Process. Mold and bacteria, often unavoidably present in spice, are eliminated. Normal food processing temperatures seldom accomplish this result.



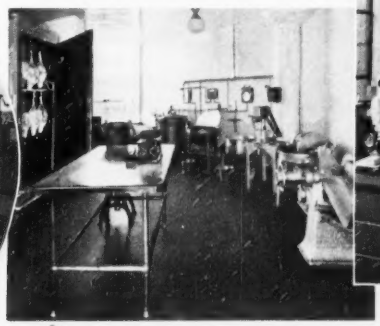
Griffith bacteriologists regularly test the purified spices, treated under Griffith's patented Sterilization Process. Food scientists know that heat and moisture provide ideal conditions for micro-organisms, mold and spores to propagate and cause spoilage. *See inset photo.* (U.S. Sterilization Pat. Nos. 2107697, 2189947, 2189949)

The GRIFFITH LABORATORIES, Inc.

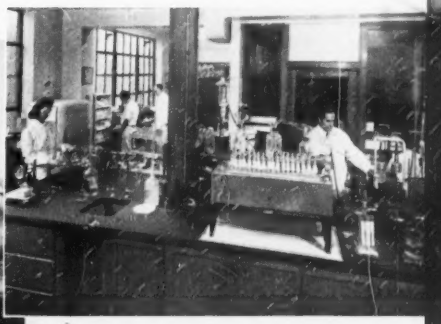
In Canada—The Griffith Laboratories, Ltd.

CHICAGO 9, 1415 W. 37th St. • NEWARK 5, 37 Empire St.
LOS ANGELES 11, 4900 Gifford Ave. • TORONTO 2, 115 George St.

The dispensing room from which Griffith spice extractions are drawn to be processed in Griffith Solublized Seasoning formulae.



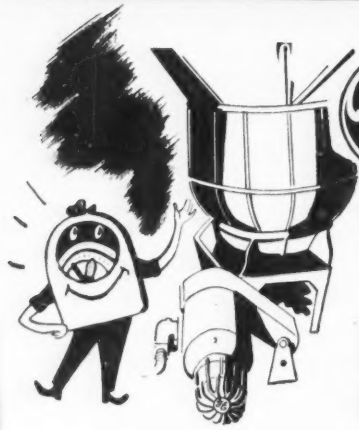
Griffith's Testing Kitchen—where facilities duplicate on a small scale all types of commercial meat and food processing. Seasoning blends for all kinds of food products often originate and are always tested here.



Part of the main testing and formulating laboratory in Chicago. In all Griffith plants, the laboratories are staffed by specialists in food chemistry. Their tests and control of seasonings used in your formula—*before and after blending*—assure purity and perfect flavor-balance, consistently.

Surely, Griffith's procedure, skills and experience can benefit you. Write us.

Leave process timing to the worker who does it best !!



type TSA-10

TIME SWITCH

General Electric's TSA-10 Time Switch is designed to make your time-interval operations as automatic as possible, thereby cutting waste and improving product uniformity. It eliminates the "human error" in process timing—frees your operators for more productive work.

Cut down on "process watching" in your plant with this reliable G-E time switch—it will do the job better at less cost. Your dividends: greater uniformity of product, a bigger profit.

THE TSA-10 IS IDEAL FOR:

HEAT TREATING EQUIPMENT	*MIXING VALVES*
MIXING MACHINES	*OVENS*
PLASTIC MOLDS	*AGITATORS*
PUMPS	*COOKERS*

—and many other applications in your plant

CHECK THESE OUTSTANDING FEATURES

Highest accuracy with Telechron* synchronous motor drive . . . external time-set knob provides easy adjustment . . . Pointer indicates elapsed time . . . quick installation with hinged cover, three knockout terminals . . . silver contacts for long life . . . corrosion resistant, dust proof case design.

Send for Bulletin GEC-452 which describes this TSA-10 Time Switch in detail. The sooner you act, the sooner your savings begin. Address Section D-603-103, Apparatus Dept., General Electric Company, Schenectady 5, New York.

*Reg. U. S. Pat. Off.

GENERAL ELECTRIC

603-203

American hard winter and 35 percent home-grown Vita wheat.

Results of the tests indicate that the stearate's effect upon loaf volume depends upon the flour used—the greater effect being in the case of government flour of higher extraction. Use of 1 percent emulsifier had little more effect than 0.5 percent. Effect of the emulsifier on texture and color of crumb was highly favorable. The crumb was softer and kept soft longer. Here again, the degree of effect depended upon the type of flour—greatest improvement was with government flour.

Organoleptic scoring of the breads showed no preference at 6 hr. but at 24 and 72 hr., the 4 tasters preferred breads containing polyoxyethylene stearate.

Digest from "The Value of Polyoxyethylene Di-Stearate As a Means For Counteracting the Staling of Bread," by J. J. Bekkering and H. M. R. Hintzer, *Chemisch Weekblad*, Sept. 24, 1949.

RESEARCH METHODS

Electrical Meters Studied For Gaging Moisture

Ten different instruments for determining moisture in cereals have been tested by the Grain Research Laboratory, Winnipeg, Manitoba. Since the electrical resistance or capacitance are functions of several properties of the cereal, of which moisture is only one, electrical measurements of moisture can occasionally be in error, especially on samples with a history of abnormal treatment or storage. For the same reason, instruments must be calibrated for the materials being tested; an instrument reading correct moisture in hard red spring wheat may be inaccurate for soft white winter wheats.

For calibrating and checking the 10 instruments, 159 samples of hard red spring wheat varying in moisture from 11.5 to 17.5 percent were used. Moistures were determined by vacuum oven and Brown-Duvel oil-distillation methods. Best results were obtained with resistance-type machines. While the relation between readings on the dielectric-type instruments and moisture content of the samples was linear, the standard error of estimate was greater than for the resistance-type machines. All instruments required temperature corrections. Dielectric instruments require uniform loading of the capacitance cell for reproducible readings, and usually have a loading hopper to insure a uniform flow of grain into the cell. Resistance instruments must have the same length of the electrical circuit filled by the cereal or its meal for each measurement. The calibration of resistance instruments can therefore

THE BEAGLE is always ready for the hunt. He is accustomed to hunting in a pack and when in action waves his tail gaily and obeys all commands quickly and cheerfully. Beagles should stand no higher than 15 inches.

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A "PEDIGREED BOX" results from integrated production, with quality control by one management from timber to finished box.

That's why American Sugar Refining Company uses Union boxes to provide safe packaging for Domino sugar from refinery to dealers' shelves.

75 years of undisputed leadership in paper packaging goes into Union boxes. Tremendous forest resources feed five of the largest paper machines in the world, in a completely integrated pulp-to-container plant unmatched in America for size and production. And four modern box plants, strategically located, serve you promptly and dependably.

Add all these *extra* assurances of consistent quality, dependable service and fair price and it's easy to see why every month more makers of national brand products are shipping in Union boxes.

TRADE MARK UNION

Dependable Packaging Since 1872

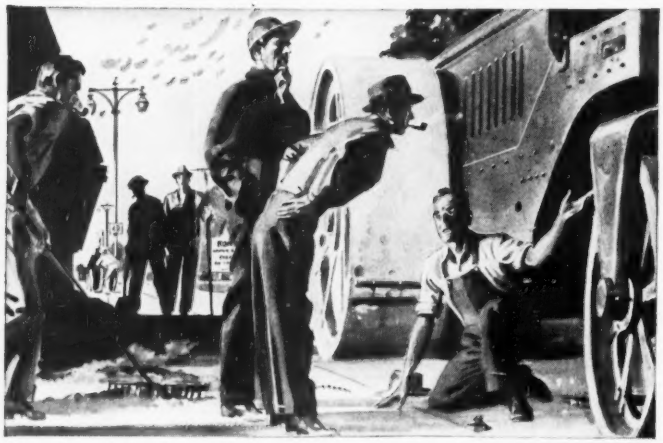
UNION Corrugated Containers

UNION BAG & Paper Corporation

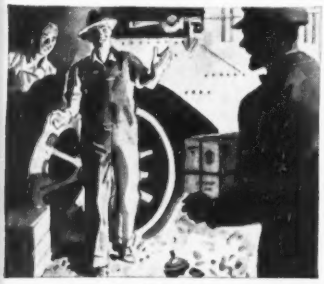
Principal Offices: WOOLWORTH BLDG., NEW YORK 7, N. Y.

Corrugated Container Plants: **SAVANNAH, GEORGIA • CHICAGO, ILLINOIS • TRENTON, NEW JERSEY**

Contractor saves penalty of $500 —by investing $3.84 in Air Express



Time clause in housing project paving contract stood good chance of being invoked when equipment broke down at 5 P.M. So 10-lb. carton of replacement parts was Air Expressed from 1200 miles away. Delivered in just 8 hours. The Air Express charge was only 83.84—and contractor completed job on time.



$3.84 is small indeed, since it covers door-to-door service. Anytime delivery, 7 days a week. Makes the *world's fastest* shipping service the most convenient.

Air Express goes by Scheduled Airlines; extra dependability, *experienced* handling. Shipments keep moving. Regular use keeps *any* business moving.

Only Air Express gives you all these advantages

World's fastest shipping service.
Special door-to-door service at no extra cost.
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Experienced Air Express has handled over 25 million shipments.

Because of these advantages, regular use of Air Express pays. It's your best air shipping buy. For fastest shipping action, phone Air Express Division, Railway Express Agency. (Many low commodity rates in effect. Investigate.)

AIR EXPRESS
GETS THERE FIRST
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Rates include pick-up and delivery door to door in all principal towns and cities

A service of
Railway Express Agency and the
SCHEDULED AIRLINES of the U.S.

shift slightly with wear of the machine, and must be reestablished from time to time.

Digest from "A Comparative Study of Ten Electrical Meters For Determining Moisture Content of Wheat," by I. Hlynka, V. Martens and J. A. Anderson, *Canadian Journal of Research*, Vol. 27F, 382-97, Oct. 1949.

MICROBIOLOGY

Freezing Cuts Bacteria In Market Shrimp

The number of viable bacteria in market shrimp is significantly reduced by freezing at −40 F. and further reduced by storage at +10 F. Reduction is greater in peeled than in unpeeled shrimp.

These were the findings of a study at Louisiana Agr. Expt. Station, undertaken to obtain bacteriological data on shrimp from the time caught until marketed. Shrimp were washed with distilled water, packed in 1-piece telescope cartons and frozen at −40 F. for 18 hr. One series was then removed to a +10 room, the cartons opened, distilled water added to cover the shrimp, and the packages returned to freezer for 24 hr. Then a portion of each lot (peeled and glazed, peeled unglazed, unpeeled unglazed, unpeeled glazed) was stored at each of the following temperatures: −40; 0; fluctuating between 0 and +10, and at +10 F.

Bacterial examinations, made 4 days after freezing, indicated reductions of 82 and 40 percent, respectively, for peeled and unpeeled. Storage at +10 F. was more destructive to bacteria than storage at lower temperatures. Coliform bacteria were found in small numbers in 69 percent of samples examined after 1 months' storage. But deaths were considerable during storage at +10 F., less at intermediate temperatures, negligible at −40.

Digest from "Bacteriology of Shrimp. V. Effect of Peeling, Glazing, and Storage Temperature On Bacteria in Frozen Shrimp," by D. Holmes and C. S. McCleskey, *Food Research*, 401-4, Sept.-Oct. 1949.

Green Spoilage in Sausage

A type of sausage spoilage in which the surface of the meat turns a dull green color sometimes occurs on wieners, small sausages, or on cut surfaces of bologna, meat loaves and cold cuts. The condition is a surface one and rarely extends more than 1 mm. or so and the interior is invariably normal in odor, flavor, and appearance.

Bacteria responsible for the discoloration are Lactobacillus and Leuconostoc species. The Lactobacilli are strongly Gram-positive, short, straight rods, that grow slowly on all plating

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LINK-BELT FLAT-TOP

For handling bottles, jars and cans through cleaning, filling, capping and labeling operations. The chain, through its freedom of articulation, prevents "humping" as the chain links remain at uniform height. When progress of containers is halted, continued chain travel will not disarrange them.

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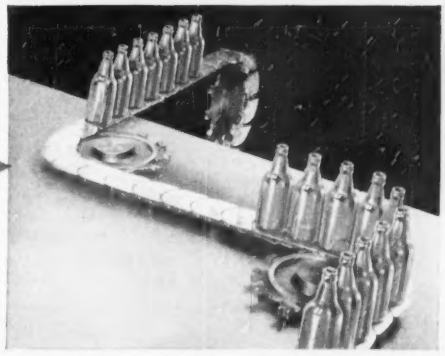

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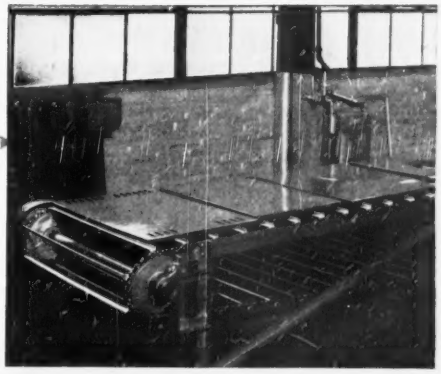

11,735

LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

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REDUCE *your hidden* "TAXES"

Slime, off-odors, decreased production, and water contamination are all hidden "taxes" that decrease your profits. But these "taxes" are UNNECESSARY! — IF — you use In-Plant Chlorination. Here's how this winning formula halts these unfair penalties.

SLIME "TAX" — In-Plant Chlorination removes all slime because it prevents bacterial growths at all points.

ODOR "TAX"—In-Plant Chlorination reduces off-odors because it kills the bacteria that produce them.

DECREASED PRODUCTION "TAX"—In-Plant Chlorination increases production by greatly reducing clean-up time.

WATER CONTAMINATION "TAX"—In-Plant Chlorination sterilizes the wash water, fluming water, and cooling water, thus preventing product contamination from those sources.

In-Plant Chlorination applied by W&T equipment increases profits by reducing cleaning costs, increasing production, preventing product contamination from unsterilized water, and by the increased efficiency of working in a "spic and span" plant.

Whether it be canning or freezing, removal of these "taxes" will increase your profits.

REPEAL THESE HIDDEN "TAXES". Vote the straight ticket, the Wallace & Tiernan ticket of In-Plant Chlorination applied by W&T equipment.

I-25

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CHLORINE AND CHEMICAL CONTROL EQUIPMENT
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media. They have an optimum temperature of 30-32 C. but grow at temperatures as low as 3 C. They are relatively tolerant to salt. The Leuconostoc species are Gram-positive spherical or ovoid cells in chains of up to 20 cells. They have about the same cultural characteristics as the Lactobacilli, and are even more salt-tolerant, growing well in 10 percent NaCl.

Discoloration of sausages by these organisms appears to be due to peroxide formation. Cured meats have had their catalase destroyed by the curing and cooking processes. Since lactic acid bacteria have no catalase, peroxides are not destroyed and discoloration of the meat pigments occurs. Catalase preparations have been found to protect the surfaces of sausages from discoloration by the greening bacilli in experimental trials.

Digest from "A Study of the Lactic Acid Bacteria That Cause Surface Discolorations of Sausages" by C. F. Niven Jr., A. G. Castellani and V. Allanson, *Journal of Bacteriology*, Vol. 58, 633-41, Nov. 1949.

FRUITS AND VEGETABLES

Citrus-Waste Press-Water Yields Essential Oil

Citrus cannery waste is customarily processed to recover a solid portion used as cattle feed, and a liquid which is evaporated for recovery of sugar. Press-water also contains essential oil, and is virtually saturated with scale-forming salts. During evaporation, the essential oil is either lost or only partly recovered, while the salts form objectionable scale in the evaporator.

A patented process proposes to overcome both of these disadvantages by pumping the press-water continuously through a heat exchanger, holding chamber, and flash tank. Heated under pressure to 250 F. or higher, the press-water flows slowly through the holding chamber and is sprayed into the upper part of the flash tank. The vapors, which contain most of the essential oil, pass out of the tank and are condensed. About 95 percent of the oil is recovered, and 35-40 percent of the scale-forming salts precipitate.

Digest from U. S. Patent 2,471,893, issued May 31, 1949, on an application dated Oct. 12, 1946, to G. N. Pulley, assigned to Feed Products Laboratories, Inc., Lake Alfred, Fla.

Grape-Product Crystallization Prevented by Ion Exchange

Reducing the concentration of potassium bitartrate in grape products by ion exchange is the crux of a patented process for avoiding the presence of crystallized bitartrate in grape jelly or jam, and sediment in

Announcing—ALL NEW—ALL PROVED

INTERNATIONAL TRUCKS

Every model *Heavy-Duty Engineered* to save you money!

Now International puts you squarely in the driver's seat—with a complete new line of completely new trucks!

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Every model offers new high standards of comfort and easy handling

Here's relaxing roominess! Here's all 'round visibility! Here's a comfortable, adjustable seat! Yes—you get everything in the Comfo-Vision Cab!

You have full visibility in the one-piece Sweepsight windshield. That convenient two-cluster instrument panel puts everything right in front of your eyes.

And when the truck starts to roll, you find that new Super-steering right for position, and positive control.

AND TALK ABOUT FEATURES...

Every new International Truck offers new improvements throughout!

NEW Functional Styling—Smart brawny appearance combines modern design with extreme practicability.

NEW Engine Accessibility—Special fender and hood design provides extra working space between engine and fenders—hoods easily removed.

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NEW Outdoor Visibility—Giant, one-piece scientifically curved Sweepsight windshield, large side windows, two rear windows.

NEW Valve-in-head engines—All test-proved for greater power, greater economy, greater stamina, greater efficiency.

NEW Steel-flex Frames—Designed to provide an extra margin of strength combined with the right amount of flexibility.

NEW Comfo-Vision Cab—Model for model "the roomiest cab on the road"—with comfort cushions, adjustable seats, controlled ventilation.

NEW Specialized Transmissions—Types and gear ratios for any job . . . three-speed, four-speed and five-speed with direct drive or overdrive in 5th.

NEW Load-balanced Wheelbases—Shorter wheelbases for standard body lengths provide better load distribution, better maneuverability.

NEW Super-Maneuverability—More positive control from a more comfortable position; new wide-tread axles assure the shortest practical turning circle and greater stability.

NEW Rear Axles for any job—Wider, sturdier rear axles—hypoid single-speed, double-reduction and two-speed with electric shift.

NEW Cradle-Action Springs—Longer springs for greater riding ease . . . stronger springs, sturdier mounting and new spring suspension for longer life.

Plus dozens of new features and refinements throughout every truck!

Proved in the mountains!

Proved on the Belgian Blocks!

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Proved on the twist course!

Every model proved under actual operating conditions!

There wasn't any price tag on the test program to prove the new International Trucks.

It was directed by men whose life work has been to develop better truck transportation. Test drivers were chosen as carefully as you do any key workers. All-outdoors was used for proving grounds. Laboratory analysis tests were backed up by track tests, then by actual road tests. Test convoys were run 'round the clock.

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INTERNATIONAL HARVESTER COMPANY CHICAGO

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Ozone generator with glass tubes fitting concentrically inside of Stainless Tubes. Because tube replacement would involve extremely high costs, straightness, ovality and I.D. tolerances were held to close limits. Carpenter Stainless Tubing, as supplied from distributor stocks, was specified for all ozone units.

Uniform walls in every length provide a tight fit for pressure or vacuum jobs. There are no "off gauge" sections of the tube wall to give corrosion a foothold. The smooth I.D. and O.D. surfaces of Carpenter Stainless Tubing resist the formation of scale and sludge. That means longer tube life.

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Standard SPIRAL CHUTES

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DETECTO-GRAM RATIO COUNTING SCALE

Another Detecto-Gram Scale to speed counting operations. Model #1743 has a special counting tray attached to the beam for use when counting in odd amounts.

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grape juice. Potassium ions are removed by synthetic or natural ion exchange materials to such an extent that insufficient ions are left to satisfy the tartrate content which would ultimately crystallize.

In general, 1 cu. ft. of cation exchange resin is sufficient to treat 40 gal. of normal grape juice, and the reduction of K content will be such as to permit mixing 1 part of treated juice with 3 or 4 parts untreated juice without danger of crystallization.

Digest from U. S. Patent 2,478,298, issued Aug. 9, 1949, on an application dated April 2, 1946, to E. E. Meschter, Glenside, Pa., and K. W. Seiter, Westfield, N. Y., assigned to Grape Belt Preserve Co., Westfield.

MISCELLANEOUS

Cold Storage Ceiling Beams Deflect Cooling-Air Stream

Thirteen types of air circulation systems have been investigated to determine their efficiency in maintaining uniform cooling conditions throughout a room. One of the objects of the study was to formulate rules for the best design and operation of cooling systems for fruit storage. Patterns of typical air circulation systems are illustrated, showing effects of ceiling beams, of location of supply and return air ducts, graduated vent openings, and uniform stacking of boxed fruit.

Emphasis is placed on uniform stacking in lines on 24-in. centers with a space of 4 in. between rows and a wall space of 8 to 18 in., depending on the size of the room. Ceiling beams will sharply reduce velocity of the entering air, and may even reverse its flow. Down-draft under beams is pronounced and harmful unless corrected by location of ducts. Good room circulation can be expected after loading when floor level velocities in the empty storage average at least 5 to 10 fpm. any place in the room, and do not exceed 50 to 60 fpm. in areas of rapid movement. Suitable velocities can be expected when there is a complete change of air in empty storage every 10 min.

Factors affecting selection of an air distribution system are: Type of storage room, type of refrigerating machinery, and whether brine spray or water defrost, large central washer or individual unit cooler are used in the various rooms. Selection of a duct system is affected by the stacking pattern, loading arrangements, position of doors and ports, type of ceiling, and size of room.

Digest from "Forced Air Circulation in Fruit Storages," by W. R. F. Grierson-Jackson and D. V. Fisher, *Refrigerating Engineering*, Vol. 57, 790-94 and 829, Aug., 1949.

—*End*

FINDINGS OF FACT CONFIRM HIGH VALUE OF ENRICHMENT

ENRICHMENT has been elevated to a new high level of national and social significance. The far-reaching Newfoundland Nutritional Surveys* have decisively demonstrated the part that flour and bread enrichment can play in reducing infant mortality, lowering the tuberculosis death rate and over-all death rate, decreasing signs of malnutrition, and increasing the alertness of children and grownups alike.

BEFORE ENRICHMENT

The first of these large-scale fact-finding surveys was conducted in 1944. Signs of malnutrition were widespread. Infant mortality and tuberculosis death rates were two to three times as high as in similar populations. Enrichment with thiamine, riboflavin, and niacin was then put into effect.

"Nutrition . . . has its significance in its relation to health. Health is defined in the World Health Constitution as follows: 'Health is the complete state of physical, mental and social well-being, not just freedom from disease and infirmity.'

"What can nutrition do? It can prolong life, give better bodies; make people happier, give them greater economic status; provide opportunity for greater social significance."

—National Health Assembly, May 1-4, 1948

AFTER ENRICHMENT

Four years later, in 1948, the second survey showed a dramatic reduction in signs and symptoms related to deficiencies of these essential nutrients. Gone to a great extent was the apathy so noticeable in 1944. Deaths from tuberculosis had decreased sharply, and the rate of stillbirths and infant deaths was strikingly reduced.

A CHALLENGE AND OPPORTUNITY

Here is a clear-cut confirmation of the high value of bread and flour enrichment to the national health. Here is a challenge to America's milling and baking industries, which have the enviable opportunity of bringing more buoyant health and greater physical and mental vigor to the people of America—through ENRICHMENT.

**These surveys were supported by the Newfoundland Government, the Newfoundland Tuberculosis Association, the individual investigators, and Merck & Co., Inc.* (The Canadian Medical Association Journal, *March 1945 and April 1949.*)

MERCK VITAMIN PRODUCTS
FOR ENRICHMENT AND FORTIFICATION

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For Millers, Bakers, Cereal and Macaroni Manufacturers Merck Enrichment Ingredients · Merck Vitamin Mixtures for Flour Enrichment · Merck Bread-Enrichment Wafers · Merck Vitamin Mixtures for Corn-Products Enrichment · Merck Vitamin Mixtures and Wafers for Macaroni Enrichment. Merck *Knows* Vitamins.

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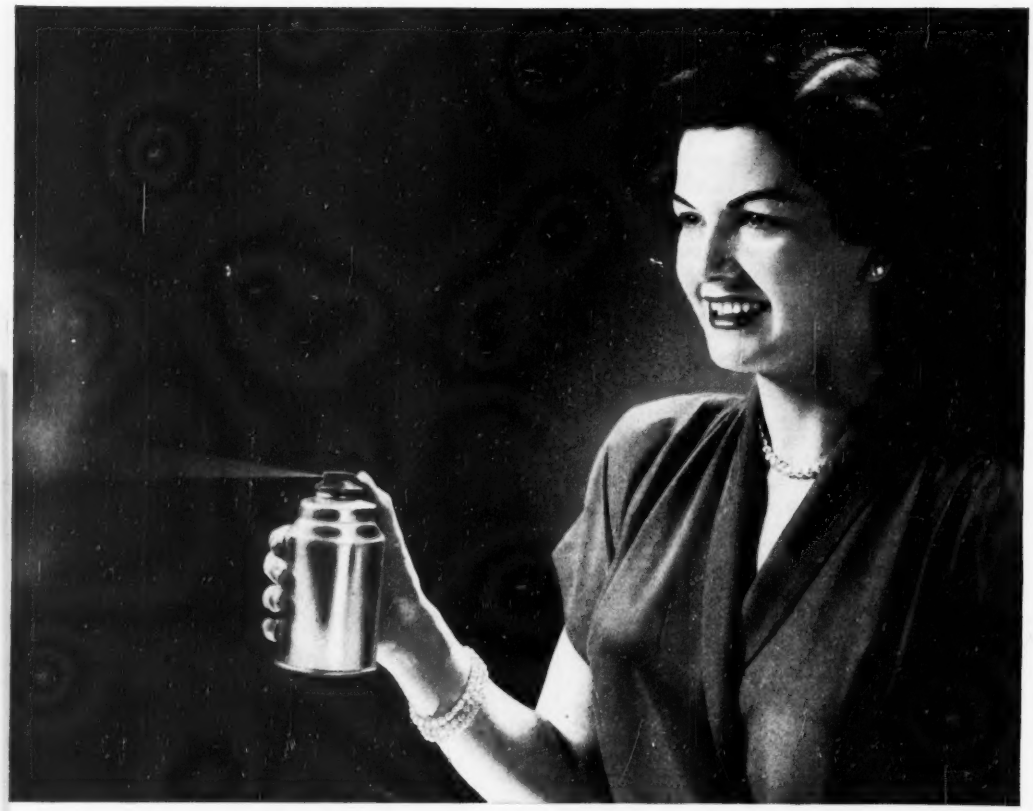
CROWN SPRA-TAINER



Most Important Can Invention in Years!

For over 50 years, cans have been manufactured in the conventional way of soldering and fabricating. Then Crown invented the can with no-side-seams and no-top-seam. To this was added a special valve—and Spra-tainer was born, the first can to spray out the contents under gas pressure. Now being used for Whipped Cream, Insecticides, Air-Conditioners, Perfumes, Plastic Sprays. Just press the top—and contents sprays out. How about *your* product—wouldn't it sell better in a Spra-tainer? Ask to have a Crown sales representative call.

One of America's Largest Can Manufacturers

CROWN CAN

PLANTS AT PHILADELPHIA, CHICAGO, ORLANDO • BRANCH OFFICES: NEW YORK, BALTIMORE, PITTSBURGH, ST. LOUIS • *Division of Crown Cork & Seal Co.*

Food Industry News

Use of Antibiotics In Canning Advanced By USDA Research

New methods of canning foods—alternatives to bringing the food to a high temperature and holding it there for a considerable period of time—is getting serious study in the Department of Agriculture. Latest technic reported is the addition of very small amounts of antibiotics to food in cans, thus permitting sterilization at lower temperature for shorter periods of time, and without pressure-cooking equipment.

First results of research with the antibiotics were announced by researches of the Bureau of Agricultural & Industrial Chemistry. Dr. G. E. Hilbert, chief of the Bureau, indicates that several years of research and testing will be required before the suitability of the new method can be known for sure.

Get Better Flavor

However, successful preliminary results have been reported on peas, asparagus, corn, green beans, peeled potatoes, tomato juice, and milk. Researchers Dr. Ariel A. Andersen, and Dr. H. David Michener of the Department's Western Laboratory, Albany, Calif., report that with the antibiotics so far used, the taste of the food is not affected, and the mild heat treatment required leaves the final products with a better flavor than found in conventionally canned vegetables.

In most of the tests so far, the antibiotic used was Subtilin, a discovery of the Western Laboratory. This substance is produced in submerged fermentation by one strain of a bacterium (Bacillus Subtilis), which occurs widely in nature and normally exists in many food products. The Laboratory's scientists also had promising results in limited experiments with Aureomycin, Chloromycetin, and Lupulon (the latter an antibiotic recently isolated from hops by researchers at the Western Laboratory).

A brief heat treatment (at 212 deg. F. or lower for 5 or 10 min.) is necessary in vegetable canning to inactivate enzymes that otherwise cause food to spoil. This treatment also destroys yeasts and fungi and all non-spore-forming bacteria. Some of these organisms are resistant to antibiotics.

Other food-spoiling organisms, chiefly the spore-forming type, are resistant to mild heat but can be easily controlled with antibiotics. In ordinary canning they are destroyed by cooking at high temperatures (up to 240 deg. F. or even higher). This is ordinarily done in pressure cookers. Sterilization takes 30 to 60 min., or longer, depending on the vegetable being canned, size of container, the heat and pressure applied, and other factors. The experiments indicate that use of antibiotics may make this longer, more severe heat treatment unnecessary.

In the Laboratory's test, Subtilin was dissolved in a 2 percent salt solution and added to the canned vegetables under vacuum. The antibiotic was used in extremely minute quantities—at concentrations of about 10 ppm., based on the weight of the canned material.

Some of the questions that still have to be answered are very important ones, however. For instance: "Do the antibiotics actually destroy the food-spoiling organisms, or do they only inhibit them?" . . . "How long is the duration of preservation when the antibiotic technic is used?" . . . "Will the antibiotics themselves breakdown over a period of time, and if so, can toxic organisms arise, or poisonous chemical combinations be formed?"

These questions are only a sample of those that will have to be answered before commercial application of the process can be considered.

T-H Law Not Effective On Farm Employees

Farm employees and unions of farm workers have no protection under the Taft-Hartley Law. Likewise, they may not be prosecuted for violations of the labor law. But if other unions violate the labor law in seeking to help the farm workers, employers may use it against these unions.

That is the reasoning of the National Labor Relations Board in a decision involving Di Giorgio Fruit Corp., Bakersfield, Calif.

To a packing company that grows its own produce away from the plant, it means that there are no Taft-Hartley restrictions on the activities of the farm hands or their unions. But the law does apply to, say, a union of non-farm workers, like the Teamsters, which might try to induce cannery workers to strike in order to force the company to bargain with the farm workers.

Minute Maid Spends $5,000,000

Joseph Di Giorgio, board chairman, Di Giorgio Fruit Corp., signs over to Minute Maid Corp., 4,700 acres of Florida orange groves for a record-breaking $5,000,000. The transaction gives MM an additional supply of about 1,000,000 boxes annually. Seated here are (from left): Alexander Standish, board chairman, Minute Maid; Mr. Di Giorgio; John M. Fox, president, Minute Maid. Standing: J. Thomas Gurney, asst. sec'y., Minute Maid; P. Gi Giorgio, president, Di Giorgio Fruit; and LeRoy B. Giles, asst. sec'y., Di Giorgio. The Di Giorgios hail from California.

IFT Convention Program Begins to Form

Lloyd A. Hall, National Program Director for the 1950 IFT Conference, to be held at the Edgewater Beach Hotel in Chicago, beginning May 21, has already arranged four symposium sessions on the subjects "Chemical Agents and Residues in Foods", "Fish and Fishery Byproducts", "Byproducts of the Packing House Industry", and "Military Subsistence of the Future".

The last-named symposium will include speakers both from the Armed Forces and Industry, who will give detailed information for all food technologists on this subject.

A Production Section includes sessions on Cereal Technology, Candy Technology, Canning Technology, and Sanitation in the Food Industry.

Research Investigations are to be divided into two divisions to include papers of vital interest to food technologists, relating to completed experimental work pertinent to the food industry, and also work in progress.

Committee meetings will be held on Sunday evening and will include reports from the committees on Chemical Residues in Foods, Pectin Standardization, Citrus Products and others.

The Frozen Foods Committee will conduct a discussion group meeting, open to all persons interested.

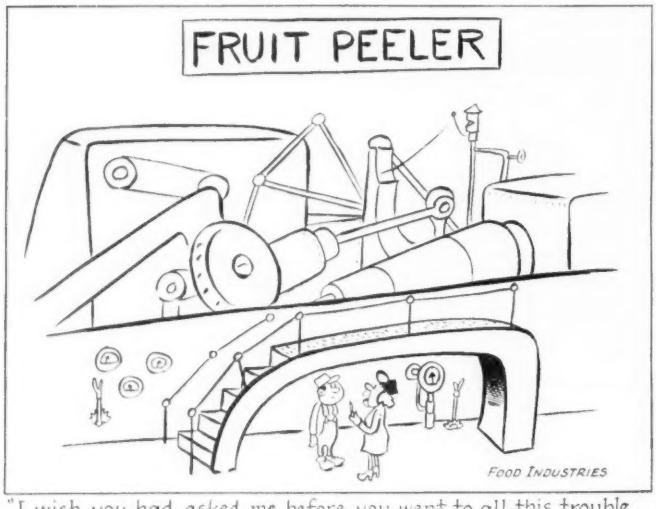
Among the speakers who have already accepted an invitation to appear on the program at the General Session, Monday morning, May 22, are Mayor Martin H. Kennelly of Chicago; Ernest H. Volwiler, executive vice-president, the Abbott Laboratories, and president, American Chemical Society; Guy E. Reed, vice-president Harris Trust & Savings Bank, Chicago; and, Henry T. Heald, president, Illinois Institute of Technology. On this program also will appear Carl Fellers, National IFT president.

The luncheons begin with the Babcock Award Luncheon on Monday, when Dr. E. B. Hart of the University of Wisconsin and Dr. C. G. King, Nutrition Foundation, will discuss Dr. Babcock's work, and present the Babcock award to the chosen recipient.

Leaders' Luncheon

One of the interesting and unusual features planned for this convention is the Executives' Luncheon on Tuesday. In view of the growing influence of food technologists in the continued development of foods and allied industries, invitations will be extended to outstanding leaders in finance and industry for this special luncheon. The purpose for such an event is to create a broader appreciation of the significant role food technologists have already assumed and are prepared to extend in the future to development of the food industries and the national economy.

The Program Committee has secured, as a speaker for this luncheon, Allan B. Kline, president, American Farm Bureau Federation, who is an outstanding figure in agricultural planning and development and who represents the largest organization of farmers in the U. S.



"I wish you had asked me before you went to all this trouble, I can do the same thing with a paring knife."

Borden Adds $15,000,000 To Building Program

The Borden Co. plans a capital expenditures program of about $15,600,000 next year, chiefly for plant modernization and replacement of equipment Theodore G. Montague, president recently told stockholders.

No important new building projects are included in the program, Montague said. Construction is for the most part limited to the modernization and expansion of present structures.

The largest single item provided for in the budget is the purchase of new trucks. As one of the country's principal fleet operators, Borden's replaces about half of its vehicles in a normal four-year period. Since such replacements could not be made during the war years, Montague pointed out, the fleet is made up of vehicles that are less than four years old or more than eight. Consequently, this type of capital expenditure will remain substantial for some time to come. A similar situation exists in some types of refrigerating equipment which will also require large outlays of capital funds.

The capital budget for 1950 includes new appropriations of $11,600,000 plus about $4,000,000 that will be carried over from the 1949 program. Since depreciation provisions will make available only about $9,000,000 for this purpose, it will be necessary to take about $6,600,000 from earnings to finance the program.

Annual Statements Show Lower Food Earnings

In the 1949 annual reports of food processing companies, decreased sales and earnings appear to be the rule. One exception among those reported here is Canada Dry, whose sales increased slightly, but not enough to halt the trend in lower profits.

Canada Dry's total net sales came to $51,477,000, compared with $50,192,244 in 1948. Net income dropped to $2,183,887 from $2,701,273 the year before.

Swift & Co. 1949 sales dropped slightly from the previous year's $2,364,372,000 to $2,215,672,000. Net earnings were $25,826,000, compared with $27,889,000 in 1948. On meat operations earnings amounted to about ⅓ c. per pound.

John Morrell & Co. showed total sales of $292,795,296, compared with $296,122,859 in 1948. Net earnings, however, catapulted from $2,587,741 in 1948 to $84,065 in 1948.

Cudahy Packing Co., with sales down only slightly, also showed a

Wide World

Dietetic Tuna

Canned in distilled water rather than fish or soya oil, this special-purpose food has been developed by Dr. E. Geiger, Van Camp Laboratories, Terminal Island, Calif. It is high in protein, low in fats, cholesterol and sodium.

---

tremendous drop in earnings, going from a 1948 profit of $1,012,737 to a net loss of $4,650,382 in 1949. Sales amounted to $559,204,524, compared to 1948's total of $567,877,126.

For the three months ended November 30, Beatrice Foods Co., showed an increase over the same 1948 quarter in both sales and profits. Net sales for the 1949 period came to $48,396,974, compared with $48,260,047. Consolidated net profits for the respective periods were $892,065 and $678,658.

Fired Cannery Worker Upheld By NLRB

Employers must be careful before discharging a worker at union request under a union security contract. Under Taft-Hartley, it is discriminatory to do this unless it is for failure to pay union dues or initiation fee.

The National Labor Relations Board made this clear in a decision against Clara-Val Packing Co., Morgan Hill, Calif., and Local 679 of the AFL cannery workers union.

Under a closed shop contract permissible during the first year of Taft-Hartley, the company discharged a woman employee who had been expelled by the union for crossing the union's picket line at the plant of Driscoll Strawberries, Inc., which was struck. The woman worked in the struck plant after her day's work for Clara-Val Packing Co.

The labor board found both the company and the union guilty of violating

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Put Your Products on a Wheat Starch Diet

Sales go up and costs go down when you use General Mills Modified A-22 Wheat Starch in your food products. The unique properties of this starch permit ingredient savings—keep your products looking better—*longer!*

If you make salad dressing, pie filling, ice cream cones, candies, dessert mixes, soups or similar foods, it will pay you to investigate A-22 Wheat Starch. Write or wire—

- No cereal taste or odor.
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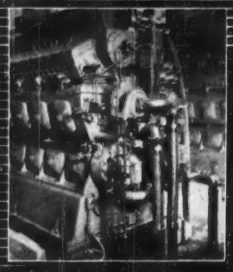
GASES?



Exhaust lines on diesel engine

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Fuel lines in heating units

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If you use tubing to convey gases or liquids, you can do it better and at less cost with Titeflex. It's made in brass, bronze, stainless, monel and inconel, to solve all heat, pressure and corrosion problems. It's made in a complete range of sizes, and it's *all-metal*, with no packing to wear out. Write us for catalog describing Titeflex advantages in full.

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Wide World

Only a Few Tons Left

Here is a portion of the powdered egg section of that Limestone cave, near Atchison, Kan., where 8,872 tons of powdered eggs are stored by Uncle Sam. There are also 20,493 tons of prunes, 1,961 tons of raisins, and 48 tons of powdered skim milk.

---

the Taft-Hartley law. The company was ordered to rehire the woman. Both the company and union were directed to reimburse her for wages lost.

The board held it was immaterial that the union had threatened to strike the packing plant if it did not discharge the woman, and that it was illegal for the union to force the company to discriminate against her by threatening a strike.

Manitoba Technologists Form Association

Food Technologist of Manitoba have organized under the name of "Manitoba Food Technology Association." This new organization composed of people working directly with the scientific phase of food manufacture, was born during an organizational meeting held in Winnipeg in October.

At this meeting the following officers were elected: Dr. E. C. Chamberlayne, Provincial Department of Health & Public Welfare, president; A. Lorne Shewfelt, food technologist, Dominion Experimental station, Morden, vice-president; and G. W. Andrich, plant chemist, Canada Packers Limited, St. Boniface, secretary.

Correction

Two errors appear in one of the charts accompanying the article, "Cut Pack Costs—With Planning Control", on page 46, December 1949 FI. Under "Plant I", the figure ending the marginal sentence that begins "At full capacity," should have been $360,000 — not $340,000. Sentence inside same chart, beginning "At reduced volume," should have ended with the figure $245,000—not $120,000.

Institute Graduates 55th Baking Class

Graduation exercises for the 55th Class of the American Institute of Baking, Chicago, were held December 16. David M. Levitt, president of Doughnut Corp. of America and a 1940 graduate of the School of Baking, was the principal speaker. He described the advances made in the baking industry since his graduation, especially the changes wrought by research in food technology and design of equipment.

He said American Institute of Baking graduates are prepared to participate in a new era of baking, but can only do so if they are aware of the progress being made. The results of scientific investigations are made available to all bakers and the graduates were urged to apply the knowledge obtained through research to the problems in their respective bakeries.

Mr. Levitt also stressed the importance of sanitation, shop layout and human relationships in food industry operations. He stated that when research has made it possible to create

better baked foods at lower cost, the per capita consumption of bakery products will increase.

Victor E. Marx recounted the history of the fund which was established in memory of C. D. Morison. The award consists of a collection of books on baking.

CIO-FTA Break

The left-wing Food, Tobacco & Agricultural Workers will be severed from CIO affiliation, probably at the mid-February meeting of the CIO executive board. This action will disrupt labor relations for some food processors having bargaining contracts with this union.

Reason: The CIO will charter an organizing committee to compete with FTA, or assign jurisdiction over the food processing industry to another CIO union, probably the Packinghouse Workers. FTA will then fight to hold its membership, small as it is.

PROCESSING

Food and Nutrition Survey For Quartermaster Corps

Research on food and nutrition, surveyed for the Army Quartermaster Corps., was recently reported by the National Academy of Science, Washington, D. C.

The report lists 4,849 research projects, conducted or supported by 679 organizations. An alphabetical listing contains the names of 5,000 professional personnel engaged in food and nutrition research.

An exhaustive literature search to ascertain the chemical requirements of the food industry was also conducted at Stanford University, resulting in a bibliography of 1,600 references.

The Quartermaster Corps, which is continuously engaged in research to improve military rations and mess, is classifying all research projects by subject matter so as to facilitate evaluation, coordinate the nationwide program, and make information on any phase of food research readily available.

Maine Experiment Station Develops Apple Juice

High quality concentrates of frozen apple juice have been developed by the Maine Agricultural Experiment Station, according to Matthew E. Highlands, food technologist of the station.

Concentrates have been prepared

HOW MUCH IS IN THE PACKAGE?

Packaging brussels sprouts for freezing —Santa Cruz, California.

There are many factors involved in a packaging operation but how much is in the package is still the main factor. Eliminating packaging leak . . . arresting customer dissatisfaction . . . meeting weights and measures regulations represent the problem. The control measure is production line checkweighing with scales to fit the product. For more than three decades EXACT WEIGHT Scales have been the preferred equipment for thousands of packaging operations. Experience has proven checking the EXACT WEIGHT way is always more accurate, faster, cheaper and therefore more profitable to the user. Write for details for your business.

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Three Winners

That Pillsbury recipe contest that wound up at New York's Waldorf-Astoria—with 100 finalists doing their stuff at 100 ovens set up in the hotel's ballroom—produced three notable winners, shown here. Mrs. R. E. Smafield (right) got a check for $50,000, Philip Pillsbury got a trainload of publicity for his company, and Mrs. Roosevelt got to handle the check while making the presentation.

using Maine McIntosh apples alone, and with blends of other apples. Because of the high concentration of flavor factors in the McIntosh, the station claims there is more true apple flavor in the finished product than when other varieties are used.

In producing the frozen apple juice concentrate, the apples are washed, ground, and pressed. The freshly expressed juice is then de-aerated and concentrated under vacuum at temperatures only slightly above room temperature. The resulting concentrated juice contains about 55 percent total solids and is reduced by addition of enough fresh apple juice to reduce the total solids to approximately 42 percent. This product is then chilled to a slush, filled into 6-oz. cans and finally quick frozen.

One 6-oz. can of frozen concentrate when diluted with three volumes of water yields 24 oz. of apple juice.

More Stable Thiamin Offered For Flour

Merck & Co., Inc., has made available thiamin mononitrate, a more stable form of thiamin to be used as the source of vitamin B_1 in all its vitamin mixtures for flour enrichment. These mixtures are now available at all warehouse points.

The company claims that the use of thiamin mononitrate represents "a signal improvement" over previously available forms, enabling enriched flour to retain its B_1 content more completely, even when adverse conditions of temperature and humidity are experienced during shipping and storage.

The new form was adopted, the company said, after extensive commercial trials and rigorous field tests confirmed its value. These tests were preceded by intensive investigations in collaboration with leading cereal chemistry laboratories.

Thiamin mononitrate meets all requirements for thiamin under the Federal Standards of Identity for enriched flour, and its use requires no change in the labeling on bags or packages to comply with Federal requirements.

Manufacturers Discuss Peanut Varieties

Concern over the effects of increased production of Runner varieties of peanuts upon this industry's economies and upon the product quality dominated the annual meeting of the Peanut Butter Manufacturers Association, at Chicago in December.

Almost double yields per acre of Runners in comparison with Spanish peanuts in South-Eastern states are putting both Spanish and Virginias at a marked disadvantage with respect to both supply and cost. A feared result is substitution of Runners in the mak-

ing of peanut butter and other peanut products with a corresponding decrease in quality and market demand.

J. H. Beattie, of the Department of Agriculture, reported results of growing and processing studies at Georgia Experiment Station on new varieties. He called particular attention to new varieties of Runners which, if adopted, will give the grower the crop yield and uniformity he desires and at the same time provide the processor with an adequate supply of uniform high quality peanuts.

Discussion evidenced a processor prejudice against Runners of all varieties and quality. As a result, the meeting passed a resolution that proper governmental agencies impart to peanut growers information that desirable increased yields in Spanish peanuts can be obtained through use of selected improved varieties for seed, seed treatment before planting, closer planting in the rows and between rows, and adequate use of sprays and insecticides.

Beattie stated that good products can be made out of all types of peanuts if they are properly handled and processed. He cited that too rapid drying of the harvested peanuts, either in the sun or mechanically, adversely affects their flavor. Best results are obtained by drying at 100 deg. C over a 3-day period. Also an oil roast at 150 deg. C., followed by centrifuging, blanching and further processing, is preferable to a mild dry roast preparatory to cooling, blanching, oil roasting and further processing.

T. W. Eselgroth, Linde-Air Products Co., New York City, discussed advantages in product quality obtainable by grinding, texturizing and packaging peanut butter in nitrogen gas as compared with air. Not only was development of rancidity greatly retarded, but there was a marked retardation in oil separation. Mere elimination of air

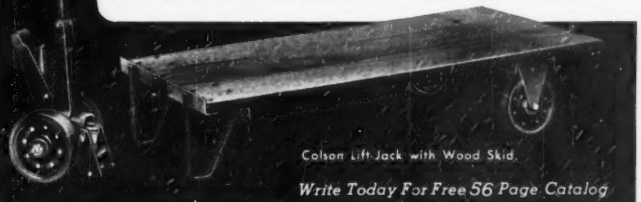
Wave Own Flag

You will have no trouble identifying General Mills properties from now on—because a flag like this one will be flying at the top. This banner will also eventually appear as an institutional insigne on product cartons, and in all forms of visual advertising used by the company.

Colson LIFT-JACK Systems Save Time, Money, Effort

Put new hustle in your materials-handling with Colson Lift Jack Systems. Through production, in and out of storage, on and off freight cars, one Colson Lift Jack with wood or steel platforms does the work of many conventional hand trucks, saves time & money.

Other cost-cutting Colson equipment includes drum and barrel trucks, platform trucks, hand trucks and famous Colson load-floating wheels and casters.



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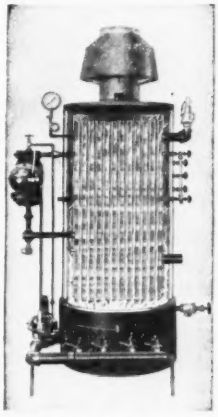

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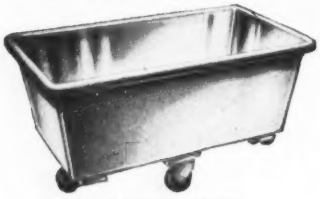
The three units of STANcase Stainless Steel Equipment illustrated below have wide application in all types of food handling plants. *ECONOMY* dictates their adoption for all operations which entail sanitary control, corrosion hazards and where it is necessary to protect quality and flavor of products.

The units illustrated are standard STANcase items which we manufacture to highest quality-specifications with *production-line economy*. Write for descriptive literature.



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FOOD HANDLING TRUCK No. 18

Ruggedly constructed of 14 gauge, sanitary Stainless Steel.
Inside dimensions: 43½" x 22¼" 16" deep.
Also available in other sizes.
Seamless construction; all corners are generously rounded; maintained clean and sanitary with minimum labor.

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Constructed entirely of sanitary, Stainless Steel. Inside dimensions: Diam. Top 19"—Bottom 16"—Depth 13¾"
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Top, back and sides 14 gauge, sanitary Stainless Steel.
Standard lengths: 8 ft., 10 ft., 12 ft.
Table Tops with cutting board extensions: from 30" to 42".
Table heights adjustable from 32" to 36".

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Wide World

Mighty Useful Gadget

Farm operators are agreed that the tractor has come to stay. No other piece of equipment has contributed so much to drastic changes in methods of planting and harvesting crops. For instance, look what this one harvested for a county fair.

in the container head space by sweeping out with nitrogen showed improvement over both atmospheric and vacuum sealing as far as rancidity development is concerned.

Cost of nitrogen used was estimated to not exceed 4c. per carton of 24 jars (1 lb). Cost of making the necessary machine conversions is indefinite depending upon manner and place the gas is introduced in the production line. The recommended procedure is introduce the gas at the underside of the compression barrel of the grinder in such a way that the gas will flow gently up through the feed hopper to sweep out the atmospheric oxygen with minimum loss of nitrogen gas and will also flow through the grinder with the peanuts, into the texturizer with the ground mass and with the butter through the filler into the jars.

When applied in this manner, the test results show: 1. Increased effectiveness of emulsion stabilizer, improved taste or palate appeal and increased spreadability, and 2. inhibited development of off-flavors in both oil and solids with retention of good eating quality of freshly roasted peanuts.

An adequate supply of peanuts for 1950 needs was reported. Present indications show an excess of 80,000 tons of all types of peanuts needed for edible uses. A breakdown shows a shortage of extra large and medium large grades of Virginias and no shortage of No. 1 Virginias or of any Spanish, although the percentage of No. 1 Spanish may be low in the low humidity area west of the Mississippi River and the percentage of No. 2 Spanish may be high in the same area.

It was pointed out that during the war years all No. 2 peanuts had to be bought by Commodity Credit Corp. and turned over to the crushers for the recovery of their oil content. Since the war, the No. 2 peanut program is open to voluntary action with the result that 1949 crop of No. 2 peanuts is to be held and sold back to the shellers next spring if needed to meet edible use demand.

The newly elected president announced a shift in emphasis by the association from combatting the support program to specific service to and source of information for the peanut butter industry.

Officers elected for 1950 are: President, John O'Connor, Hogue Mercantile Co., Kansas City, Mo., and Vice-President, Robert C. Canby, Wm. S. Scull Co., Camden, N. J.

Cotton Brokers Become Food Processors

The cotton firm of Ander-on, Clayton & Co., Houston, Tex., has branched out into the food processing field with two plants soon to be opened in Mexico and South America.

Officials of the company said recently that the plants, located at Sao Paulo, Brazil, and Monterrey, Mexico, are now in operation but have not been formally opened. The Monterrey plant

was to be opened recently but building difficulties have postponed the opening until mid January. Opening date for the other plant has not been announced as yet.

The plants are designed for processing of cottonseed oil products such as margarine, peanut butter, mayonnaise, fully hydrogenated shortening, cooking and salad oils, and salad dressings. Cost of the plants is estimated at $5,000,000.

USDA Grade Standards

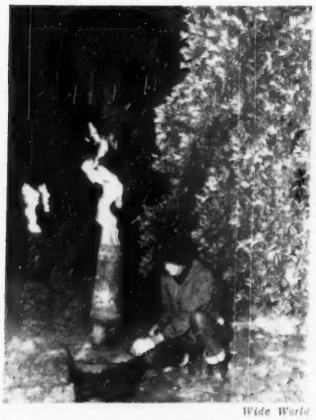
Recent actions by Production & Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards include the following:

Canned pineapple, second revision, proposed, page 7846, December 30 *Federal Register*, written comments received until January 29 (not to be confused with F&DA proposed standards of identity, quality, and fill of container announced for hearing in October 1950).

Poultry and domestic rabbits, revised, effective January 1, 1950, page 6835, November 15 *Federal Register* (minor corrections page 7727 December 28 *Federal Register*). These regulations take the place of all current regulations and specifications for classes, standards, and grades for poultry and domestic rabbits.

Grapefruit and oranges, revised, effective on publication, November 15 *Federal Register*, page 6828 and 6831.

Oranges in California and Arizona, revised, effective on publication in



Wide World

Warmed Over Oranges

Smudge pots made their 1950 appearance in California's orange groves early in January, when sub-freezing temperatures moved down from Alaska to remind the growers of the rigors of January '49.

HERE'S A SLICK SEPARATOR...

Bauer

MAGNETIC GRATE

A GRATE with magnetized bars to grab tramp-iron—that's the Bauer Magnetic Grate. The grate is set on a frame in a floor opening or in the throat of a hopper. When bulk materials are dumped, poured, or shoveled in, the grate attracts and holds ferrous chunks and particles which would damage machinery and contaminate the product.

Bauer Magnetic Grates are available in every practical shape and size from 2" x 4" up to 6 or 8 ft. square. They can be used for demetalizing dry or liquid materials: peanuts, for example, as shown in the photograph.

Our bulletin No. M-3-A fully describes Magnetic Grates and other types of Permanent Magnet Separators. A copy will be gladly sent upon request.

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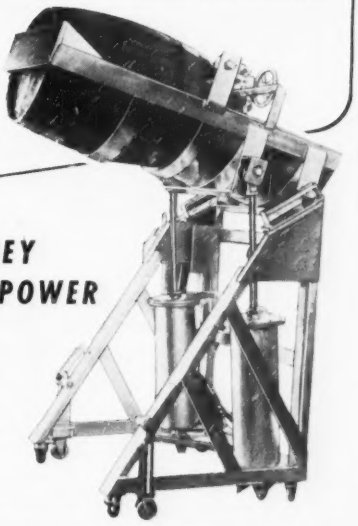
The Industry's Most Important Development



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LEE Materials Handler dumping 500 lb., 54 gallon barrel of preserves in 4 ft. high kettles. Other models for specific jobs. Write for Bulletin LM-13.

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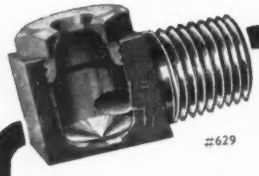

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WAX FRUITS
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if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

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Soil Recovery

The widespread food processing problem of recovering mineral-rich soils from raw materials is solved at this Hawaiian sugar mill by a 120-ft. Dorr Hydroseparator, which handles 10 mgd. of wash water containing approximately 275 tons of minus-4 mesh solids. Underflow containing 25 to 35 percent solids is pumped through 5-in. pipe direct to the cane fields. Clarified effluent is pumped back to the washer house.

November 26 *Federal Register*, page 7149.

Grapefruit (California and Arizona), revised, page 7369, December 9 *Federal Register*, effective January 8.

Fresh Carrots, new, page 6785, November 10 *Federal Register*, effective December 10.

Fresh Tomatoes, revised, page 6711, November 5 *Federal Register*, effective December 5.

F&DA Food Standards

Salad dressings tentative order, issued on page 6721 of the November 5 *Federal Register*, has drawn quite a number of exceptions from interested parties. Perhaps most comprehensive of the nine exceptions filed by the December 26 closing date was that of the Mayonnaise & Salad Dressing Manufacturers Association. Typical of their exceptions were the following:

(1) Acetic acid minimum of 2½ percent proposed by F&DA should be substantially lower or eliminated entirely; (2) lactic and tartaric acids should be optional ingredients, along with citric acid; (3) minimum of 35 percent oil in French dressings should be lowered to 25 percent; (3) no label distinction should be made between different types of emulsifying ingredient; (4) liquid egg yolk minimum at 4 percent should be substantially reduced, perhaps to 2½ percent as the industry recommended during the hearing; (5) a minimum of 30 percent oil in "Salad Dressing" should be reduced to a 25 percent minimum; and (6) a positive statement was desired that there is no basis for a cottonseed oil allergy warning in the ingredient statement on the label.

Next official move will be the issuance of a final order, which may or may not be a modification of the tentative order, depending upon the weight given by the Federal Security Administrator to such exceptions as those above mentioned.

Creamed cottage cheese final order was published on page 7236 of the December 1 *Federal Register*. It made no change in the existing standard, which calls for fluid cream and milk to be used as the "creaming" fluid.

"*Tolerances* for poisonous or deleterious substances on or in fresh fruits and vegetables" were to be discussed at a hearing beginning January 17. A preliminary schedule for Part A of the hearing was issued by Presiding Officer Bernard D. Levinson on December 22. It indicated that about four months would be required to hear the witnesses who had responded to the original hearing notices.

Use of Dulcin and P-400 as artificial sweeteners for foods was ruled out in an F&DA policy statement appearing on page 321, January 19, Federal Register. Reason: Injuries had been observed in two-year chronic toxicity studies with rats. Use in drugs "is to be discouraged" until further study.

Interpret "Production"

Clarification of the term "commercial production" of fresh fruits and vegetables was made in a statement by F&DA on page 7810 of the December 29 *Federal Register*. For the purposes of the residues hearing, the term "commercial production" will be interpreted to mean production up to the time of harvest. "It is not the purpose of the Agency to receive evidence at this hearing relating to poisonous or deleterious substances used after harvest, unless the same sub-

stances are used before harvest or unless these substances affect the safety of or the tolerance of consumers for other substances used before harvest."

Canned oysters which formerly had to be designated "Pacific Oysters" may now be called simply "Oysters" as a final result of court action initiated by Willapoint Oysters, Inc.

Briefs were being filed on the *bread* hearing up to a new closing date of January 19, extended from December 20 by a December 14 order of the presiding officer.

Final order on *cheeses* and tentative orders on *frozen fruits, canned mushrooms,* and *canned corn* were still awaited at the beginning of the year.

Food & Drug Administration's division of litigation at Washington headquarters is now known as "division of regulatory management" through a notice published on page 6959 of the November 16 *Federal Register.* No change in the function of this group accompanies the change in name.

DISTRIBUTION

Wisconsin Group Forms To Market Cheese

Swiss Cheese Corp. of America has been established at Monroe, Wis., to serve Swiss cheese producers of the area in marketing their product. The firm began operaiton January 1 and has cold storage and curing facilities for more than 1,000,000 lb. of cheese and reserve capacity for an additional 3,000,000 lb.

The company is home owned and independently operated with Carl O. Marty, Jr., chairman of the board. Cheese meeting the standards of the company will be marketed on a nationwide basis under the brand name "SwisSelect".

Operations are being carried on at the Monroe Cold Storage Building, but early in April the company will occupy permanent quarters.

Coffee Imports in 1949 Reach All-Time High

Coffee imports into the U. S. will show an all-time high in 1949. W. F. Williamson, secretary-manager, National Coffee Association, says that official figures soon to be published will reveal an increase of approximately 1,000,000 bags, or 132,000,000 lb., above the 1948 figure, which was itself an all-time high.

It is recognized that not all the coffee imported in the calendar year 1949 was consumed, since the widespread

HAPMAN
Tubular Chain or Cable
CONVEYOR
FOR FLOWABLE MATERIALS

Is Yours a PECULIAR CONVEYING PROBLEM?
SUCH AS . . .

IS YOUR CONVEYING PROBLEM CONCERNED WITH THE HANDLING OF A MATERIAL RESEMBLING IN WEIGHT, SIZE, DENSITY OR TEXTURE ONE OR MORE OF THE FOLLOWING:

- Powdered coffee • Filter earth
- Soap cuttings • Spent grains
- Sugar and flour • Zinc oxide
- Coal and Coke • Talc powder
- Ground cork and peanuts
- Ceramic powders

The above "flowable" products and many others are now being handled successfully by HAPMAN CONVEYORS. The complete list is given in our catalog which shows also the many ways Hapman Conveyors can be used to help solve "peculiar" conveying problems.

cleanliness—sanitation—contamination • odor—flame—explosion control • keeping several types of materials segregated • accurate volumetric feeding • operations in more than one plane or direction without transfer points • limited space for clearances and supports

These are only part of 45 "peculiar" conveying problems which are met successfully by the completely engineered Hapman Conveyors.

HAPMAN CONVEYORS, INC. 2405-A W. McNichols Road Detroit 21, Michigan

IF YOU'RE THINKING OF
Customer Satisfaction
YOU SHOULD BE THINKING OF
D.O Flavors

Because assured customer satisfaction for your seasoned or flavored food product can be achieved easily with Spicealate (water-solublized) flavors, Essential Oils or Oleo Resins.

In addition to manufacturing a superior food product you also gain production economies resulting from lower handling and storage costs.

Satisfy yourself — Satisfy your customers — Consult D & O.

D.O DODGE & OLCOTT, INC.
180 Varick Street • New York 14, N.Y.

ATLANTA • BOSTON • CHICAGO • CINCINNATI • DALLAS • LOS ANGELES • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO

ESSENTIAL OILS • AROMATIC CHEMICALS • PERFUME BASES • VANILLA • FLAVOR BASES

Here's a profitable spot for your plant!

NEAR CROPS ▶ **MODESTO REFRIGERATING COMPANY** offers over 60 acres of cleared sites in the lush San Joaquin Valley, where weather makes year-round processing possible.

NEAR STORAGE ▶ Ample cold storage space, with complete handling equipment and services. Large capacity quick-freezing facilities.

NEAR SHIPPING ▶ Rail and truck loading docks, adjacent airport and proximity to ocean shipping, place your plant in the highway to all markets when you locate here.

Write for Free Illustrated Booklet

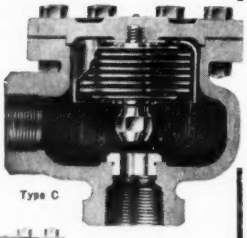
MODESTO REFRIGERATING COMPANY
MODESTO, CALIFORNIA

Leading Processor

SHORTENS OPERATION from 65 to 45 Min.

with Nicholson Steam Traps

Records of a recent installation of Nicholson steam traps, by a large food packer, show they cut cooking time 30%; e.g., one operation was shortened from 65 to 45 min. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential; 2) have 2 to 6 times average drainage capacity. Also record low for steam waste; and maximum air-venting capacity. Widely specified for preventing damage to thin gauges; eliminate cold blow in unit heaters.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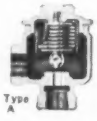
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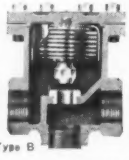
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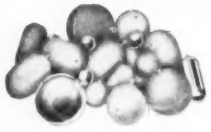


5 TYPES FOR EVERY PURPOSE—Size ¼" to 2"; press. to 225 lbs. **BULLETIN 1047.**

HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms and as tanks or vessels. 2-day delivery. **BULLETIN 348.**

W. H. NICHOLSON & CO., 193 Oregon St., Wilkes-Barre, Pa.

consumer hoarding caused by the shortage scare was responsible for any extraordinary rate of roasting in the later months. However, the actual increase in imports indicates that the consumer still found coffee a very good value throughout the year. In spite of all the excitement caused by the rapidly increasing prices, Mr. Williamson points out, that the consumers during 1949 as a whole paid less than ¼c. per cup more for coffee than they paid in 1948. The purchasing power in Latin-America however increased by some 263 million dollars.

Total value of imports for the current year will amount to approximately $960,000,000 against $697,000,000 for 1948. Coffee prices are expected to remain relatively high during 1950, but the average American home consumer, Williamson said, will not pay more than 4c. per day.

Canned Citrus Grades Need Separate Label

Florida canners must place a grade label on all citrus packed in compliance with the grade labeling law, it was ruled by Circuit Judge D. O. Rogers on December 5 at Bartow. It was another victory for the Florida Citrus Commission in the controversial measure.

The court ruled for the commission that canners must register one label for each separate grade of citrus juice or fruit sections.

Suit brought by the California Packing Corp., of Tampa, was dismissed. The corporation sought to have the commission accept labels which would represent the two highest grades of citrus product. Most of the canners had argued that the new citrus code provides that one label may stand for either "A" or "C" grades. The law provides for "A" and "C" grades of canned products. Cans of citrus falling below the standards of those grades must be labeled "substandard." The law does not provide for a "B" grade.

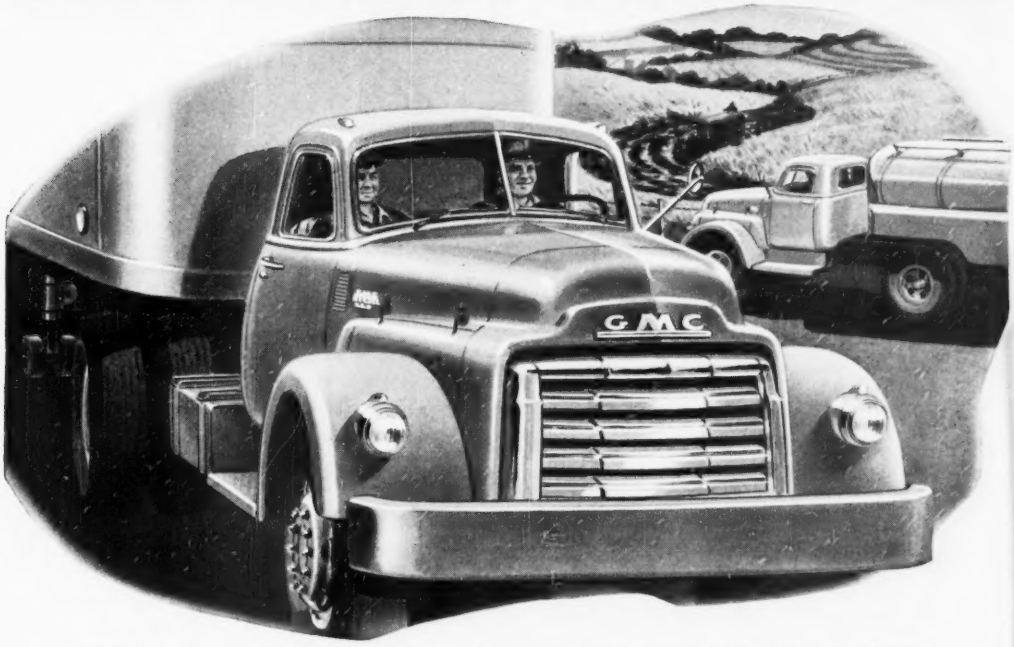
The law further provides that a canner either must stamp the grade on a can of citrus or register with the commission a label representing a particular grade.

"Converted" May Remain In Rice Trademark

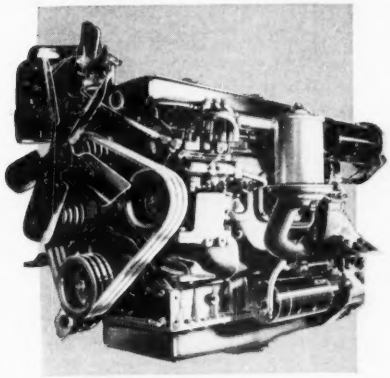
Converted Rice, Inc., Houston, Tex., has won the right to continue use of the word "Converted" in its trademark in a ruling handed down by Assistant Commissioner of Patents Joe E. Daniels, in Washington.

Proceedings against use of the word

New "WEIGHT-SAVING" GMC DIESEL TRACTORS



Providing the Many Advantages of GM 2-Cycle Design for Many More Over-the-Highway Haulers



Famous "4-71" GM 2-cycle Diesel engine which powers GMC Diesel 640-650 models. Operates with double the power strokes of 4-cycle types, thus providing lighter weight, greater payloads. Has direct injection, Uniflow scavenging, many other extra-performance features.

There are two bright new stars in the over-the-highway transport field. They're the new GMC 640-650 series Diesel-powered tractors . . . high efficiency, weight-saving hauling units that open up great new profit possibilities for operators in the lower weight transport ranges.

Their brilliantly performing engines, of the same GM 2-cycle design as used in the nation's finest locomotives and motor coaches, combine the industry's highest power-per-pound ratio with outstanding economy, long life and low maintenance.

With wheelbases ranging from 141 to 165 inches, CA dimensions of 60-84 inches and a vast variety of equipment options, the new 640-650s are ideally suited for over-the-road transport of food and meat.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

GMC
GASOLINE • DIESEL
TRUCKS

Illinois packer solves problem of cooling catsup

● An Illinois packer solved the problem of cooling bottled catsup with a conveying system that utilizes the advantages of Cyclone Flat Wire Metal Conveyor Belt. Cooling takes place as the product moves along to final capping, labeling and packing operations.

Cyclone Conveyor Belts permit all types of processing . . . washing, cooking, steaming, cooling, drying . . . without interrupting production.

Have you investigated the cost-saving possibilities of Cyclone Metal Conveyor Belts? Get in touch with the nearest Cyclone sales office; and write for Catalog No. 4 today.

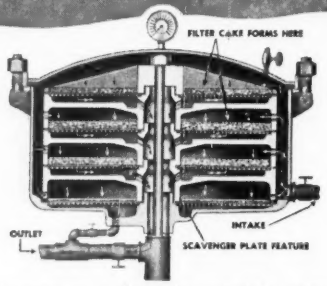
CYCLONE FENCE DIVISION
(American Steel & Wire Company)
DEPT. H-20, WAUKEGAN, ILLINOIS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

CYCLONE METAL CONVEYOR BELTS
UNITED STATES STEEL

FOR HIGH SPEED, UNIFORM FILTRATION REQUIRED IN FOOD PROCESSING

SPARKLER *horizontal plate* FILTERS

Capacities 50 G.P.H. to 5000 G.P.H.



HERE ARE A FEW FOOD PRODUCTS THAT SPARKLER FILTERS HANDLE WITH EASE:
Candy Scrap
Chicken Broth
Cider
Egg Albumen
Extracts
Flavors
Honey
Gums
Liquors
Milk
Molasses
Vegetable Oil
Syrups
Vinegars
Wines
Fruit Juices
Alcohols
Alkalies
Beverages

Sparkler Filters operate on a distinctive principle, using horizontal plates, that are particularly efficient in maintaining uniformity in operation over a wide range of pressure, temperature, or viscosity conditions.

Filters water sparkling clear, removes all off-tastes, odors, color, sediment, chlorine, sulphur, algae, pipe rust, etc.

Because filter media are supported on a horizontal plane and filter aids floated into position uniformly, filtration takes place uniformly over entire filtering areas. Flow through filter is always with gravity. The patented scavenger plate filters the last drop, leaving no hold over in batch filtration.

We invite correspondence on your problems. You will receive the advice of filtration engineers with over a quarter of a century experience in a specific field.

SPARKLER MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS

were instituted by River Brand Rice Mills, New York, on the grounds that the word was not distinguished of Converted Rice's product, a processed rice food named "Uncle Ben's Converted Rice." River Brand further claimed the word to be generic, descriptive, and incapable of identifying the product's source, and that Converted Rice did not use the mark for a year before filing its registration.

Assistant Commissioner Daniels ruled that the mark had not been employed by any other firm during that period, and he admitted that "the line of demarcation between a mark which is merely descriptive and one that is generic and incapable of trademark significance is frequently intangible and difficult to determine. There is nothing in the record to show the mark has any special meaning in the rice trade other than to express the broad meaning thereof as expressed in the dictionaries."

Tomato Promotion

A large-scale promotion of canned tomatoes and tomato products will be conducted in January by the Can Manufacturers Institute, according to Harold H. Jaeger, director of CMI's marketing bureau.

Tested recipes, articles and photographs will be sent to newspaper food editors and radio broadcasters whose consumer audience totals 101,000,000.

Schedule of Events

February

6–18—Penn State College, short course on market milk and milk supervision; School of Agriculture, State College, Pa.

11–14—Institute of American Poultry Industries, 20th annual fact-finding conference; Municipal Auditorium, Kansas City, Mo.

20–25—Penn State College, short course in testing milk, cream and other dairy products; College of Agriculture, State College, Pa.

27–Mar. 1—Oregon State College, 39th annual dairy manufacturing short course; Corvallis, Ore.

March

6–9—American Society of Bakery Engineers, 26th annual meeting; Edgewater Beach Hotel, Chicago.

6–11—State College of Washington, 19th annual institute of dairying; Pullman, Washington.

23–24—University of Wisconsin, dairy manufacturers conference; Department of Dairy Industry, Madison, Wis.

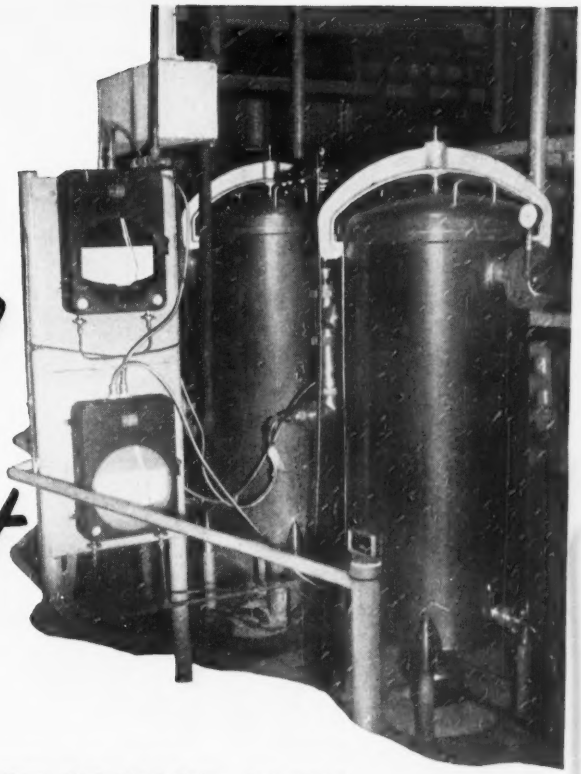
27–29—American Dairy Assn., annual meeting; Morrison Hotel, Chicago.

April

24–27—American Management Assn., 19th national packaging exposition; Navy Pier, Chicago.

—*End*

air in your product



CAN TAKE THE WIND OUT OF YOUR SALES

Yes, a little thing like excessive oxygen in your product can materially affect your sales. Dissolved air can destroy product appearance . . . adversely affect flavor, color, aroma and vitamin content.

Rex Micro-Film Deaerators can help you put some "push" behind your sales. They effectively remove excess oxygen . . . preserve food flavor, color, vitamins.

For example, in the catsup bottling plant shown above, Rex Deaerators remove the microscopic oxygen bubbles that cause "black neck" and the hard core that prevents easy pouring. And they make possible higher filling speeds since they eliminate the foaming that retards the filling operation.

Why not investigate the possibilities of Rex Micro-Film Deaerators for your operation? Whether you process catsup, tomato juice, soups, fruit juices, baby foods, frozen concentrates, or almost any fluid or semi-fluid product, these efficient units can help you improve product appearance and flavor . . . help step up sales. For all the facts, mail the coupon.

Chain Belt Company
1616 West Bruce St., Milwaukee 4, Wis.
Gentlemen:
( ) Please send me a copy of Bulletin 47-1
( ) I would prefer to have a Rex Food Processing expert call on me.

Name.....

Company.....Dept.....

Address.....

City.....State.....

CHAIN BELT REX COMPANY

. . . FOOD PROCESSING EQUIPMENT

BY INDUSTRY-WIDE REQUEST

FAMOUS "BCF" ALL-PURPOSE EXCHANGERS NOW PRODUCED IN *All-Stainless Steel*

At low unit cost!

Your industry asked for it. So here it is ...the first fully standardized, all-stainless steel shell and tube exchanger ... identical in design and dimensions to its cupreous counterpart, the world-famed "BCF" ... and like it, mass produced!

ROSS

Serving home and industry

THE NEWS THAT BROKE JUST A FEW MONTHS AGO

. . . via this Ross ad in several business magazines. So great was the response that —

PRODUCTION HAD TO BE BOOSTED

. . . to keep current with orders. Result? Lower manufacturing costs — savings passed on to you.

SO, DOWN GO PRICES AS MUCH AS 22%

. . . on some sizes and from 10 to 22% on others.

$ $ SAVE $ $

Act now. If you haven't yet obtained information on the new Ross Type SSCF, do so at once by writing for Bulletin 1.7K1.

ROSS

FIRST WITH FULLY STANDARDIZED ALL-STAINLESS STEEL EXCHANGERS

ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corporation 1443 West Ave., Buffalo 13, N. Y.

Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Changes in Food Supplies

Stocks and Storage

STOCKS in canners' hands on December 1, compared with '48, were reported as follows by NCA (000 omitted):

	Actual Cases	
	1949	1948
Tomato juice	15,917	17,528
Sweet corn	26,968	19,563
Peas	13,909	16,851
Red pitted cherries	1,202	826
Pumpkin and squash	447	1,506
	(Basis 24/2½'s)	
Pears	3,354	2,876
Peaches	12,604	10,611
Sweet cherries	804	245
Apricots	1,818	3,129
	(Dozens)	
Baby foods	52	48

FROZEN FISH AND SHELLFISH held in storage December 1 totaled 161,554,407 lb., compared with 157,553,730 lb. held a month earlier and 158,007,754 lb. held Dec. 1, 1948.

PUBLIC COOLER occupancy was at 67 percent on December 1. This was 1 point below the final figure for November 1. The normal November-December decline is 2 points.

FREEZER occupancy gained 3 points during November, to stand at 73 percent filled on December 1. This was still well below the five-year average of 82 percent for this date.

Production

ICE CREAM production in November, estimated at 33,570,000 gal., was 3 percent smaller than November 1948 output, and 2 percent below the 1943-47 December average. The October-November decline was 13 percent, compared to 6 percent in 1948.

SHERBET production in November was estimated at 720,000 gal., 5 percent more than the November 1948 output, but 47 percent under the five-year November average.

AMERICAN CHEESE reached an estimated output of 51,600,000 lb., a decline of only 17 percent from October. Seasonal decline in 1948 was 21 percent, and the five-year average drop was 23 percent. Production was 6 percent higher than November 1948 and 14 percent above the five-year average.

CREAMERY BUTTER produced in November climbed to 90,740,000 lb., the largest output for the month since 1943. Production was 13 percent above both November 1948 and the five-year average for the month. The seasonal decline was 12 percent, compared to 15 percent a year ago and 18 percent in the five-year average.

LIQUID EGG production reached 8,020,000 lb. in November, well ahead of the 4,146,000 lb. turned out the previous November.

DRIED EGG production, totaling 1,207,000 lb. in November, was also ahead of November 1948, when 927,000 lb. were produced.

FROZEN EGGS came to 3,674,000 lb. in November, the second largest production for the month on record. It was topped only in November 1944, when 6,291,000 lb. were produced.

THE FOLLOWING PACK totals were compiled by the National Canners Association:

TOMATO JUICE packed in 1949 came to 20,559,673 actual cases, compared with 23,701,199 actual cases in 1948.

CANNED PEARS reached 5,797,000 cases on a 2½'s basis in 1949. In 1948 the pack was 3,992,854 cases on the same basis.

CANNED LIMA BEANS packed in 1949 almost doubled the 1948 pack. On a 24/2's basis, the pack came to 4,371,000 cases, compared with 2,476,000 cases the year before.

Indexes

Business Week's index of business activity was up to 194.7 for the week ending January 7, compared with 192.6 the week before, 186.8 a month earlier, and 196.1 a year earlier. The 1941 average was 162.2.

THE COMMODITY INDEX on foods, compiled by the *New York Journal of Commerce*, stood at 170.2 for the week ending January 13. This compares with 168.7 for the previous week, 170.9 for December, and 178.9 for January, 1949.

CONSTRUCTION

	Pending (thousands)	Total Awarded Jan. (thousands)	Total Awarded 1949 (thousands)
Bakery	$250	$596	$8,701
Beverages	218	.....	19,394
Canning and Preserving	300	200	115
Cold Storage	.....	.....	2,859
Confectionery	330	.....	1,547
Grain Mill Products	2,285	346	32,917
Ice, Manufactured	.....	.....	75
Meats and Meat Products	168	275	8,417
Milk Products	411	143	9,498
Miscellaneous	870	80	18,975
	$4,832	$1,640	$102,498*

*Complete 1949 total.

Everyone has problems

"Haven't you one that isn't so lumpy?"

If yours happens to be an emulsifier for process cheese, or dairy products . . . *Investigate*

VICTOR DISODIUM PHOSPHATE, DUOHYDRATE

Disodium phosphate, duohydrate is a product recently added to the Victor phosphate family. At present, it finds its greatest application as an emulsifier for process cheese, and evaporated milk. In each of these cases, disodium phosphate, duohydrate produces a smooth and creamy product. The important advantages of this Victor phosphate are its rapid solubility, free-flowing character, extremely high purity, and uniformity. Investigate Victor disodium phosphate, duohydrate today! Your request for an experimental sample or quotation will be given prompt attention.

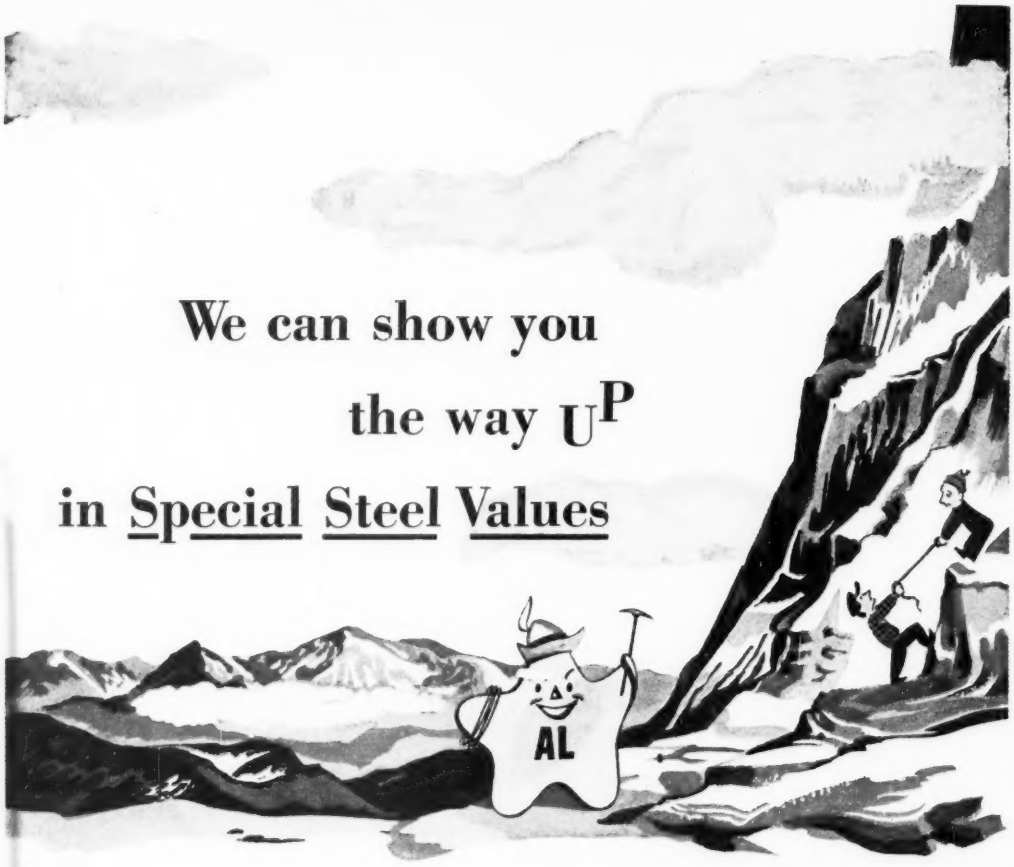
VICTOR CHEMICAL WORKS
141 West Jackson Boulevard, Chicago 4, Illinois.

Investigate Now! MAIL THIS COUPON TODAY!

Victor Chemical Works
141 West Jackson Blvd., Chicago 4, Illinois
Please check
☐ Sample of disodium phosphate, duohydrate.
☐ Please quote prices for 100 lb. bag.

Name _____ Title _____
Company _____
Street _____
City _____ Zone _____ State _____
V7

We can show you the way UP in Special Steel Values



The only real value in a material lies in what it will *do* for you. Will it improve the quality of your products—let you give more to the user at the price? Or, on the other hand, will it improve your cost position—help to keep open your vital area of profit?

When you begin to think about better materials, you're automatically in the field of special high-alloy steels—*and Allegheny Ludlum*. From the various AL families of stainless and heat-resisting steels, tool steels and sintered carbides, special high-temperature alloys and electrical materials, let us help you to select the metals that will yield the benefits you're looking for.

Just remember that the first cost of a special steel may be only a little, if any, more than the material it replaces—and it's usually many times cheaper in the long run. • *Our Technical Staff is fully at your disposal.*

Complete technical and fabricating data—engineering help, too—yours for the asking.

ALLEGHENY LUDLUM STEEL CORPORATION

The Nation's Leading Producer of Stainless Steel in All Forms

AL

Pittsburgh, Pa. . . . Offices in Principal Cities

Allegheny Metal is stocked by all Jos. T. Ryerson & Son, Inc., Warehouses

W&D 2333

Men, Jobs, Companies

ANNE BARNARD was recently placed in charge of consumer relations for The Nestle Co., Inc., New York City. She has wide experience in this field and was formerly director Women's Div. Nat'l. Safety Council.

GLENN F. HILTS is newly elected vice-president of Commander-Larabee Milling Co., Minneapolis, to be in charge of southwestern operations. He succeeds Ellis D. English, who recently became company president.

JAMES J. WINSTON was appointed associate director of Jacobs Cereal Products Laboratories, Inc., New York City. A member of ACS, IFT, and AACC, he has been chief chemist and sanitarian with the company for 14 yr.

THOMAS W. BALFE, vice-president in charge of sales for National Distillers Products Corp., New York City, was named president of company's subsidiary, the White Rock Corp. He succeeds H. I. Peffer, board chairman.

Industry

American Maize-Products Co., Roby, Ind., has appointed C. D. Henning, H. L. Adams, and G. G. McGeorge as assistant plant managers. Earle E. Langland was recently named plant manager.

American Society of Refrigerating Engineers announced 1950 officers to be: President, J. G. Bergdoll of York Corp., York, Pa.; vice-presidents, P. B. Christensen of Merchants Refrigerating Co., New York and E. Simons, consulting engineer from San Francisco; and treasurer, R. C. Jordan, professor at U. of Minnesota.

Apple Concentrates, Inc., of Sterling Junction, Mass. has been organized to produce frozen apple juice concentrate. A pilot plant is under construction at West Concord, Mass. by the National Research Corp. of Cambridge which has entered into a long-term license agreement with the new company. Process will be similar to that used by Minute Maid Corp. which was originally organized by National Research Corp.

Armour & Co., Chicago, has elected E. W. Wilson vice-president in charge of by product auxiliaries; E. E. Evans, vice-president in charge of new pork division; and G. E. Leonard as general attorney.

Birds Eye-Snider Division of General Foods Corp. recently opened a new quick-frozen French fried potato plant in Caribou, Me. Plant is equipped with latest scientific equipment for rigid quality control.

Borden Co. is spending about $15,600,000 this year for plant modernization and equipment replacement according to Theodor G. Montague, company president.

Burlington Co-Operative Assn., Burlington, Okla., is constructing a 290,000 bu. grain elevator.

Canada Dry Ginger Ale Co., Toronto, Ont., has under construction a new bottling plant at Sudbury, Ont.

LaNasa Baking Co., New Orleans, has been purchased by Ward Baking Co., New York.

Pepsi-Cola Co.'s president, Walter S. Mack, announced appointment of J. K. Wright as new manager of its Alexandria, Va. plant and J. L. Bate as manager of the Newark, N. J., bottling facilities.

Pillsbury Mills, Inc. is considering a substantial expansion of its milling and elevator properties at Buffalo, N. Y.

Quaker Oats Co. has purchased an industrial site along the Tennessee River near Chattanooga.

Reynolds Metals Co. has organized a new container department of its foil division. George Du Charme will head the department.

Swiss Cheese Corp. of America, a new firm for the production and sale of Swiss Cheese, has been established at Monroe, Wis.

Seven Up Montreal Ltd. has been formed to take over operations of Seven Up of Montreal Ltd. and Seven Up of Quebec Ltd., which have been acquired by a group of Canadians from the U. S. owners.

Supreme Foods Co., Knoxville, Tenn., was sold to two former employees—W. Herbert Cox and Hubert Taylor.

Swift & Co.'s Ice Cream Division purchased equipment and business of B. & B. Ice Cream Co., Inc., Cincinnati.

H. F. Tennant Ltd., Amherst, Nova Scotia, carbonated beverage bottler, has started construction of new plants in Moncton, New Brunswick.

Telling-Belle Vernon Co., Cleveland is dividing its milk and ice cream division into two separate companies. Belle Vernon Milk Co. will handle the milk business and Telling Ice Cream Co. will conduct the ice cream trade.

Unilac, Inc. has purchased control of Lamont, Corliss & Co., N. Y., manufacturers of Nestle's Chocolate products.

Westgate-Sun Harbor Co. was created by the merger Westgate Sea Products Co. and Sun Harbor Packing Co.

PAPER that gets around

A Salute to Kleenex Tissues —that fine product that has helped suffering mankind to endure the common cold. There is nothing smarter or handier than a new Pocket-Size Package . . . heat-sealed snugly and safely in its snow-white glassine wrapper—a Rhinelander creation—an excellent use of this versatile paper.

Recipes and advertising leaflets are far more likely to be seen when enclosed within the product itself. And when that product contains shortening which would penetrate and stain ordinary paper . . . that's where the use of Rhinelander Snowdrift Glassine is very sensible and correct.

Crackers served with your soup, or cookies with your sundae, are fresher and crisper—and you can bet more sanitary—when sealed in individual envelopes of Rhinelander Moisture-Proof Glassine. Restaurant waste is reduced, and diners like this thoughtful extra service.

Glassine
and Greaseproof
the functional
papers that
do so many
tough jobs
well.

IN THE LAND O' LAKES • RHINELANDER, WISCONSIN

DR. L. E. CLIFCORN, director of product and process research division of Continental Can Co., Chicago, was elected chairman of ACS division of agricultural and food chemistry. He succeeds C. R. Fellers, head of food technology at U. of Mass., who was named to the division's executive committee.

---

of San Diego. New firm will be one of the largest packers of tuna in southern California.

Weston Bakeries Ltd., subsidiary of George Weston Ltd., is building a new bread bakery in Edmonton, Alberta, Canada.

Personnel

Eberhard Anheuser, vice-president of Anheuser-Busch, Inc., St. Louis, was recently elected to the newly created position of board chairman.

Frank J. Cahn was recently named vice-president in charge of research for Louis Milani Foods, Maywood, Calif.

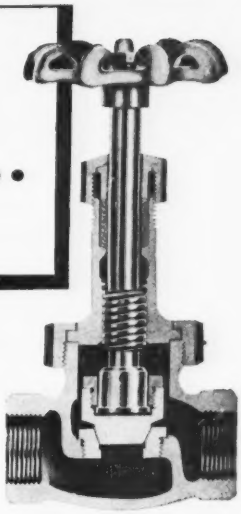
H. R. Ansel, secretary-treasurer of Wm. J. Stange Co., Chicago, has been elected a director of the firm to fill vacancy caused by death of E. J. Marum.

Dr. C. H. Fisher, formerly chief of protein and carbohydrate division of USDA's Eastern Regional Research Laboratory, Phila., is now director of Southern Regional Research Laboratory, New Orleans.

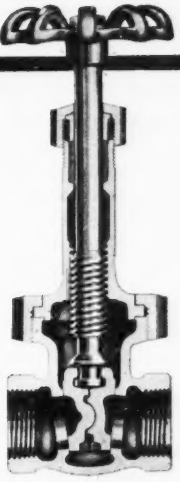
Clifford L. Bedford has recently been named food technologist in department of horticulture at Michigan State College.

Bryan Blalock, Marshall, Tex., is new president of Southern Association of

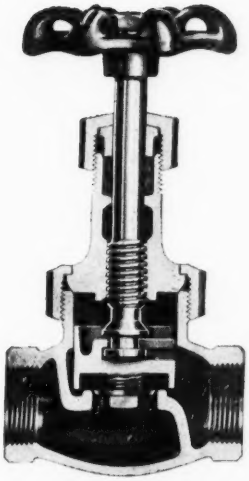
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

WALWORTH
valves and fittings
60 EAST 42nd STREET NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

SAFEGUARD VITAL PROCESSING OPERATIONS WITH Kathabar HUMIDITY CONTROL

Check — If you are doing these or similar processing operations you should know how the Kathabar System of Humidity Control has stabilized production, reduced operating costs, and provided quality control never before possible in industry. Ask a Kathabar Humidity Engineer to tell you all the facts.

A PARTIAL LIST OF KATHABAR APPLICATIONS

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Photographic Film Processing and Storage
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Stencil Drying
Sensitized Paper Mfgr.
Drug & Pharmaceutical Mfgr.
Gelatin Capsule Processing
Glue Drying • Shellac Drying
Chemical Processing
Processing of Sodium
Vitamin Mfgr.
Gunpowder Processing
Processing Plastics
Rocket Powder Processing

MANUFACTURING
General • Ceramics Drying
Storage of Highly Finished Metal Parts (Corrosion Prevention)
Compressed Air Drying
Covered Cable Drying

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Cupola Dry Blast (Foundry)
Safety Glass Manufacturing
Magnesium Castings Production
Aluminumizing Process

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Candy Making • Fish Drying
Bean Sprout Cultivation
Vegetable Dehydration
Processing Powdered Coffee
Cranberry Dehydration
Milk Drying
Spaghetti Mfgr.

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COMPANY.....
ADDRESS.....
CITY.....STATE.....

SURFACE COMBUSTION CORPORATION • TOLEDO 1, OHIO

Ice Cream Manufacturers at the group's annual meeting held recently at Biloxi, Miss.

Karl J. Brunnings has been appointed assistant director of chemical research and development for Chas. Pfizer & Co., Inc., Brooklyn, N. Y.

Charles H. Conner, Jr., is the newly designated southeastern sales manager of corn products department of Anheuser-Busch, Inc.

Herbert L. Fisher was appointed head of the newly established marketing division of the Peter Hand Brewing Co., Chicago.

Benson Littman, vice-president in charge of Ekco Products Co.'s baking division, has been elected president of the firm's new subsidiary, National Glaco Co.

Earle E. Langeland has been appointed operations manager of American Maize-Products Co., Roby, Ind.

C. K. McInnes was appointed vice-president in charge of bakery products for Standard Brands Ltd. of Canada.

A. E. Staley, Jr., president of the A. E. Staley Manufacturing Co., Decatur, Ill. has received the Norwegian decoration, the Commander with Star of the Order of St. Olaf, in recognition of his service as director of the ECA.

K. F. Wadsworth has been elected president of Maple Leaf Milling Co., Ltd., Montreal, Canada, to succeed D. C. MacLachlan, who was appointed board chairman.

Randall Whitaker has been designated director of the dairy technology department of National Dairy Research Laboratories, Inc., Oakdale, L. I., N. Y. Henning A. Trebler is the firm's new director of engineering research and development.

Associated Industry

Anderson-Nichols & Co., Boston, announces appointment of Bert W. Whitehurst as project engineer.

Chicago Metallic Mfg. Co. has appointed Henry P. Montminy as eastern sales manager of its Bakery Division.

Electric Industrial Truck Assn. elected at the annual meeting the following officers: M. W. Heinritz, Trenton, N. J., president; W. A. Meddick, Cleveland, vice-president; and

"Makes Coffee Right— MORNING, NOON OR NIGHT"

This statement is used by The Nestlé Company, Inc., in advertising its soluble coffee product, NESCAFÉ ®. And to make certain that the quality of Nescafé ® is as "right" when it reaches the consumer as it is when packed. The Nestlé Company, Inc., gives this product *double* protection.

First, there's the dependable Crown Screw Cap. This cap not only has the patented Deep Hook Thread which gives greater sealing pressure, but also has a liner which has been carefully selected for maximum sealing efficiency on this product.

Remove the Crown Screw Cap and there's INASEAL . . . the inner seal that gives extra protection against evaporation, moisture, tampering and sampling because it adheres to the lip of the jar. INASEAL is available in a variety of materials to meet the specific sealing requirements of individual products.

A Crown Representative will gladly supply full information about this efficient combination as well as any facts you may want about its installation in your plant. Crown Cork and Seal Co., Baltimore 3, Md. *World's Largest Makers of Metal Closures.*

CROWN CLOSURES

Approved by millions of housewives

CM

LIGHT WEIGHT—HEAVY DUTY

CYCLONE

Picture this: a high speed chain hoist that weighs only 35 lbs. for the 1 ton capacity model. No more struggling with slow, ponderous, outmoded hoists. The Cyclone can be carried around with ease. Lifts loads rapidly with an easier pull on the chain. Can take the rough handling of maintenance crews or the continuous duty of production application. Workmen are grateful... do their work faster, safer and better when they have a Cyclone

AVAILABLE IN capacities from ¼ to 10 ton.
For all the construction details write for Bulletin 145 C or phone your local distributor for a demonstration in your plant.

CHISHOLM-MOORE

HOIST CORPORATION

(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York, Chicago and Cleveland • Distributors Everywhere

W. Van C. Brandt, Pittsburgh, secretary-treasurer.

Robert Gair Co., Inc., New York, announces that its Canadian subsidiary, Gair Co. Canada Ltd. (Toronto, Ont.), has purchased capital stock and real estate of Premier Paper Box, Ltd., Montreal.

Koch Butchers' Supply Co., North Kansas City, Mo., announces plans to confine activities entirely to the manufacture and sale of refrigerators and allied equipment.

North American Car Corp. is starting a program of rebuilding its refrigerator cars and those of its subsidiary, North Western Refrigerator Line Co. The cost is estimated at $2,000,000.

R. D. Travers Co., Canadian representative for Cambridge Wire Cloth Co., has moved to larger quarters in West Hamilton, Ontario.

Arthur Colton Co., Detroit, has added following associates to its representation throughout the eastern territory: G. W. Covey; O. E. Pfannkuch & Co.; R. P. Waller & Associates; R. A. Bernick; and Cecil Packard.

Deaths

Joseph S. Auerbach, 80, retired head of D. Auerbach & Sons, candy manufacturers, New York City—at his home in New York, Dec. 21.

Bernard R. Armour, 58, president of American Aniline Products Inc., and Heyden Chemical Corp.—in New York City, Dec. 1.

David T. Bofinger, 64, president of the Great Atlantic and Pacific Tea Co.—in New York City, while attending a company luncheon, Dec. 19.

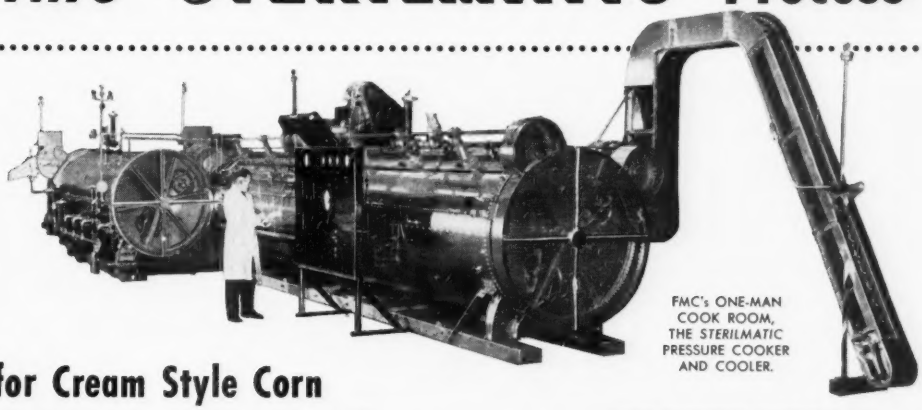
Allan B. Carver, 60, general superintendent of mills for Commander-Larabee Milling Co.—suddenly, at his Minneapolis office, Dec. 21.

Frederick A. Frankenfield, 60, vice-president in charge of production of American Maize Products Co.—in St. Margaret's Hospital, Hammond, Ind.

Joseph L. Jackson, 51, director and general manager of the Spoon River Milling Co., Lewistown, Ill.

N. D. Naman, 65, president of San Joaquin Valley Winery and Distillery, Inc., Fresno—Nov. 25. —*End*

Announcing the Continuous Automatic fmc STERILMATIC Process



FMC's ONE-MAN COOK ROOM, THE *STERILMATIC* PRESSURE COOKER AND COOLER.

for Cream Style Corn of Superior Color and Flavor

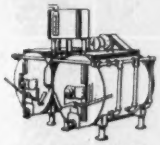
The new FMC *STERILMATIC* Process employs a short, high temperature sterilizing principle, essential for outstanding quality in cooking cream style corn, and certain other canned foods. The basis of the *STERILMATIC* Process is the widely used FMC Continuous Pressure Cooker and Cooler, in combination with other necessary equipment. This "*one-man cook room*," centrally controlled, utilizes automatic protective stops and signals in processing canned products in a fast continuous flow. Rolling agitation of each can results in rapid uniform heat penetration, requiring less cooking time than under other methods. Smooth mechanical progression of cans from cooker elevator to cooler discharge avoids denting and damage. Valuable savings in manpower, steam, water and floor space are effected. In addition, the FMC *STERILMATIC* Process produces cream style corn of superior color and flavor . . . with greater retention of essential vitamins.

An important adjunct to FMC STERILMATIC *equipment is the new FMC Air Blast Can Dryer which quickly and thoroughly dries cans. No reheating is required . . . permitting immediate labeling and casing.*

OTHER EQUIPMENT REQUIRED FOR *STERILMATIC* PROCESSING OF CREAM STYLE CORN

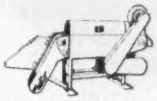
FMC CONSISTOMETER

FMC BLENDING MIXER



FMC BATCH MIXER

DoZURIK AUTOMATIC CONSISTENCY CONTROLLER



NEW (OPTIONAL) FMC AIR BLAST CAN DRYER

WRITE TODAY. *A new booklet fully describing the FMC* STERILMATIC *Process for cream style corn is available on request. Write for full information or contact your nearest FMC representative.*

First in Food Equipment

FOOD MACHINERY AND CHEMICAL CORPORATION

Canning Machinery Divisions

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Can it be canned?

CHECK WITH CONTINENTAL

Continental has the right package for everything from spice to syrup. Our cans for the food field come in every practical size and shape. And we are ready to sit down with you and talk over your packaging requirements.

Packaging plans call for lithographed labels? Continental's master lithographers take pride in making each can its own point of sale display. Brilliant colors and clear lettering are a big help against competition — particularly in self-service markets.

You will rate Continental service tops too. We have both the research facilities to meet your technical problems and the manufacturing capacity to assure you of a dependable source of supply.

Why not check with Continental today?

You can't beat Continental as a dependable source of supply!

CONTINENTAL CAN COMPANY

100 East 42nd Street

New York City 17, N. Y.

Books

Materials Handling

CONVEYORS AND RELATED EQUIPMENT, 2ND EDITION. *By Wilbur G. Hudson. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1949. 468 pages; 6¼ x 9¼ in.; cloth. Price,* $7.

As in the first edition published five years ago, the author discusses practically every type of conveyor and elevator used in the science of materials handling. Developments since 1944 have made necessary a great deal of revision. And there are such additions as an extended study covering pneumatic conveyors, dust explosion hazards, recent technical improvements that make belt conveyors suitable for far greater lengths and capacities, and the application of motorized industrial trucks.

Cleaning Materials

SOAPS AND DETERGENTS. *By E. G. Thomssen and John W. McCutcheon. Published by MacNair-Dorland Co., 254 W. 31st St., New York 1, N. Y., 1949. 511 pages; 6¼ x 9¼ in.; cloth. Price,* $9.

With a subject that is among the primary interests of the food plant operator, this book concerns recent developments as well as fundamental principles in the manufacture of soaps and detergents.

Included are discussions on continuous soap making processes, commercial production of synthetic detergents, and the application of new equipment and materials.

Food Science

OUTLINES OF FOOD TECHNOLOGY, 2ND EDITION. *By Harry W. von Loesecke. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y., 1949. 585 pages; 6¼ x 9¼ in.; cloth. Price,* $7.50.

Improvements in food processing and advances in food equipment design, since publication of the first edition eight years ago, have made this revision necessary. Products as well as methods, born since the beginning of World War II, are given particular attention in this new edition.

The book offers a basic account of present-day food technology, covering developments through most of 1949. It includes such aspects of food science as the role of electronics, dehydrofreezing, use of ethylene in fruit preparation, quick freezing technics.

Written by a Department of Agriculture chemist, with a bow to many of the country's leading food technologists, the book is well worth the investment to any food plant library.

Operating Details

FLOWSHEETS OF FOOD PROCESSES. *Published by* FOOD INDUSTRIES, *330 W. 42nd St., New York 18, N. Y., 1949. 154 pages; 8¼ x 11 in.; paper. Price,* $2.

Picture flowsheets for the multitudinous processes common to the food industry fill this latest FOOD INDUSTRIES extra. From agar to yeast and from baking, bottling and canning through freezing and all the rest, the operating details are all there.

This is a book that should be welcomed by food management, by experienced food technologists, and by newcomers to the field. Its appearance is particularly timely during a period when operational efficiency offers about the only cost-cutting channel left to a highly taxed and labor besieged industry.

In fact, we are willing to defy association with certain kinds of money by saying, "we know this is good because we made it ourselves."

Government Publications

THE PREPARATION AND STORAGE OF SKIM MILK FOR USE IN ICE CREAM. *By B. H. Webb. Bureau of Dairy Industry. BDIM-Inf-79.* Describes relationship of properties to care and pasteurization.

THE USE OF WHEY IN SHERBETS. *By F. E. Potter and D. H. Williams. Bureau of Dairy Industry. BDIM-Inf-81.* Gives some experimental results on relation of composition to freezing time.

HUMIDIFYING APPARATUS FOR SMALL TEST ROOMS. *By T. C. Scheffer and O. W. Torgeson. No. R 1752. Obtain from Forest Products Laboratory, Madison 5, Wis.* Describes simple humidity control device suitable for laboratory-assembled equipment.

PRODUCTION OF MANUFACTURED DAIRY PRODUCTS, 1948. *Bureau of Agricultural Economics. CS-40.* A comprehensive statistical report.

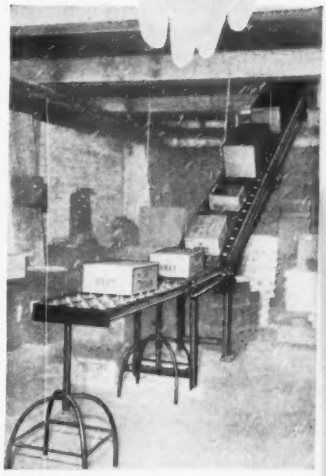
ALMONDS, NOT-SHELLED, SHELLED, AND BLANCHED. *Report of U. S. Tariff Commission. Mimeographed.* A

Keep

"HANDS OFF" FOOD

to get

HANDS ON PROFITS



Eliminate the hand work with BUSCHMAN Conveyors

Yes, the elimination of "hand" work through the installation of BUSCHMAN Conveyors in processing plants has in many instances reduced food handling costs as much as 30 per cent.

Regardless of whether it is food in process or food in packages there is a BUSCHMAN "Better Built" Standard or Special Conveyor for every food handling purpose. Write for your catalog today.

Buschman Conveyors

The E. W. Buschman Co., Inc.
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THE SHELF-SHAPE BAG THAT PACKS WITHOUT SLACK

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One reason why more manufacturers are turning to the DELTASEAL PACKAGING SYSTEM*

Deltaseal Bags are flat . . . top and bottom . . . so, they're easy to stack in attractive, space-saving displays. There's no slack-pack appearance to discourage sales. The Deltaseal closure helps the bags keep that full-pack look. Housewives like this closure, too, because the "built in" spout makes easy pouring.

Deltaseal lowers packing costs. Deltaseal Packaging Machinery is designed for Deltaseal bags alone. It fills, shapes and closes the bags fast . . . 2,000 or more an hour, depending on the commodity. Mostly automatic, it handles volume packing with real efficiency.

Let a Bemis representative explain more of the benefits in the Deltaseal Packaging System. Call or write your nearest Bemis office.

***THE DELTASEAL PACKAGING SYSTEM**
Deltaseal Bags plus the Deltaseal Packaging Machinery.

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Cleveland • Denver • Detroit • East Pepperell • Houston • Louisville
Indianapolis • Jacksonville, Fla. • Kansas City • Los Angeles • Mobile
Memphis • Minneapolis • New Orleans • New York City • Norfolk
Oklahoma City • Omaha • Peoria • Phoenix • Pittsburgh • Salina
St. Louis • Salt Lake City • San Francisco • Vancouver, Wash. • Seattle
Wichita • Wilmington, Calif.

Bemis

comprehensive statistical document which shows the procedure followed when the government investigates the effect of present and prospective import competition under the present Tariff Law. More important for general principles than in respect to the individual commodity.

MARKETING FROZEN FOODS—FACILITIES AND METHODS. *By J. S. Larson et al./U. S. Department of Agriculture. Mimeographed. Available from Information Branch, Production & Marketing Administration of USDA.* A comprehensive resume of present practice and the scope and character of the frozen foods business.

ORIENTAL METHODS OF USING SOYBEANS AS FOOD WITH SPECIAL ATTENTION TO FERMENTED PRODUCTS. *By A. K. Smith. Bureau of Agricultural & Industrial Chemistry. AIC-234. Mimeographed.*

FATS AND OILS CONSUMED BY CITY FAMILIES. *Commodity Summary No. 2. Bureau of Human Nutrition & Home Economics. Mimeographed.* A market analysis.

LIST OF PUBLICATIONS AND PATENTS OF WESTERN REGIONAL RESEARCH LABORATORY, 1941 TO 1949. *Bureau of Agricultural & Industrial Chemistry. AIC-256. Mimeographed.* Permits comprehensive review of nearly ten years' activity.

SURVEY OF THE CHEMICAL COMPOSITION OF COTTON FIBERS, COTTONSEED, PEANUTS, AND SWEET POTATOES. *By J. D. Guthrie, et al. Bureau of Agricultural & Industrial Chemistry. AIC-61 (revised to March 1949). Mimeographed.* A literature review.

ANNUAL REPORTS. Government departments, bureaus, and independent agencies are currently supplying their Annual Reports to Congress for the Fiscal Year which ended June 30, 1949. Those wishing such documents should address the individual bureaus in which they are interested. When they are not available for free distribution, the inquirer will be advised as to the availability for purchase through the Superintendent of Documents.

The above recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue.

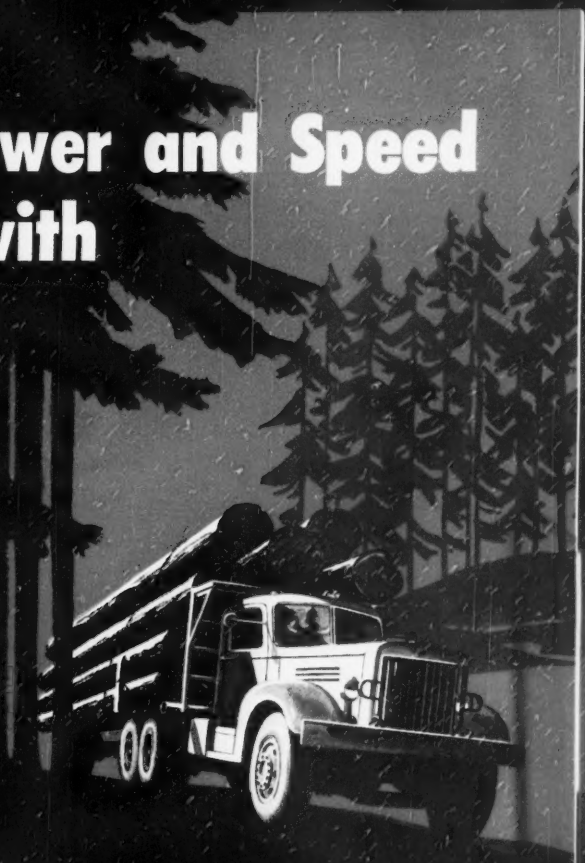
—End

Extra Pulling Power and Speed in Your Trucks with

EATON

2-Speed Truck

AXLES



In the kind of service that requires extra pulling power and extra speed to make time on the open highway, Eaton 2-Speed Axles provide the perfect balance of power and speed. On trucks that must "take it," Eaton Axles reduce stress and wear—not only on the axles themselves, but on engines and all vital vehicle units. Longer axle life with minimum maintenance cost is assured because Eaton's exclusive forced-feed oiling system provides positive lubrication at all vehicle speeds. Eaton Axles are available for most trucks of 1½ tons and larger. Ask your truck dealer for a road demonstration.

More Than a Million Eaton 2-Speed Axles in Trucks Today

Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

POLAR BEAR CLIMATE with C. H. W. Steam Jet VACUUM REFRIGERATION —at LOWEST COST, too

Polar bears know what they're doing when they choose to remain where they can depend on the constantly cold climate they need. You, too, can equally depend on C. H. W. Steam Jet Vacuum Refrigeration to give you required cooling conditions for your chemical or food process requirements. And, of equal importance, is its economy. When compared to mechanical types of refrigeration, C. H. W. Steam Jet Vacuum Refrigeration Systems are lowest in purchase price, lowest in installation cost and lowest in maintenance. (In many cases, the cost of operating a vacuum refrigeration system is 5 to 20% less than for an ammonia or carbon dioxide system for temperatures ranging from 35 to 60° F.) Furthermore, since water is the refrigerant, hazards of noxious or poisonous ammonia, sulphur dioxide, etc. are eliminated. Cooling is by flash evaporation, using either live or exhaust steam. The system is easily operated and service life is long. For complete information on how C. H. W. Steam Jet Vacuum Refrigeration can be applied to your cooling problem, write now for Catalog No. 1462.

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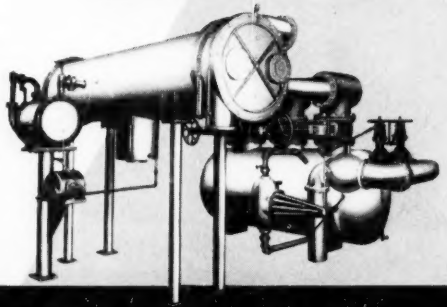
1828 Sedgley Avenue, Philadelphia 32, Pa.
REPRESENTATIVES IN MOST PRINCIPAL CITIES

Photograph below shows a C. H. Wheeler Steam Jet Vacuum Refrigeration System employing a Surface Condenser. Low Level Jet and Barometric Jet (Direct Contact) Condensers can be used, depending on requirements.



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SINCE 1903

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Sugar means QUALITY

That's why SUGAR MEANS SALES!

WHY DO LEADING MANUFACTURERS of food products use all-sugar formulas? Because they take no chances: they know that only sugar gives them the quality that makes their products household bywords.

★ **Sugar is universally accepted.** Every housewife uses it, and you can't get that real home-made flavor with anything else. Sugar points up the natural flavors of all foods.

★ **Sugar is economical.** It can be used alone—in all prepared foods and beverages. No need to fiddle around with a complicated mix. Sugar offers you the most for your money—10% to 50% more sweetening power than other sweetening ingredients.

★ **Sugar is uniform.** Real sugar, derived from the sugar cane and the sugar beet, is brought to you just as nature made it. That's one reason it's always uniform, unmatched in purity.

Why risk customer dissatisfaction? Always use sugar for the full rich flavor, the better *value* that means better sales!

SUGAR INFORMATION INC.
NEW YORK 5 NEW YORK

THERE IS NO SUBSTITUTE FOR SUGAR

DEHYDRATING, MOLASSES REFINING, and CANNING PROCESSES at TEXSUN CITRUS EXCHANGE

Demonstrate Versatility of GAS

TEXSUN CITRUS EXCHANGE PLANT, WESLACO, TEXAS. Dehydrating and concentrating plant is shown at upper right, where cloud of vapor indicates evaporation of moisture from dehydration of citrus peel.

CITRUS BY-PRODUCTS processing is a large part of the operations of Texsun Citrus Exchange, Weslaco, Texas. One of the world's largest processors and canners of citrus, Texsun not only packs juices and edible fruit but processes the residue into citrus molasses and citrus pulp used in stock feeds.

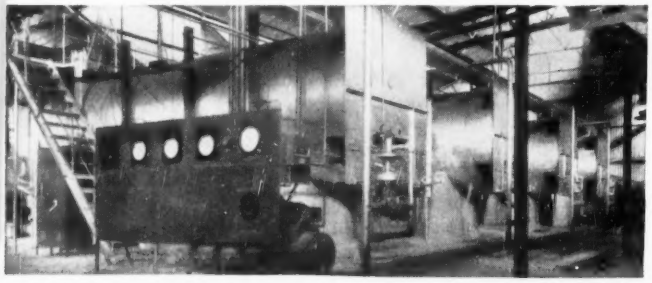
Although Gas is used for all Texsun heating operations, its major role is in the dehydration and refining process. The rotary kiln method, which consists of eight 90′ kilns with a total capacity of 40 tons of raw products per hour, is the dehydration process which completely dries the pulp and peel.

A unique method developed by Texsun, to purify and retard fermentation of their citrus molasses products, is to inject natural gas and air directly into the liquid, igniting it and causing it to heat as it bubbles to the surface.

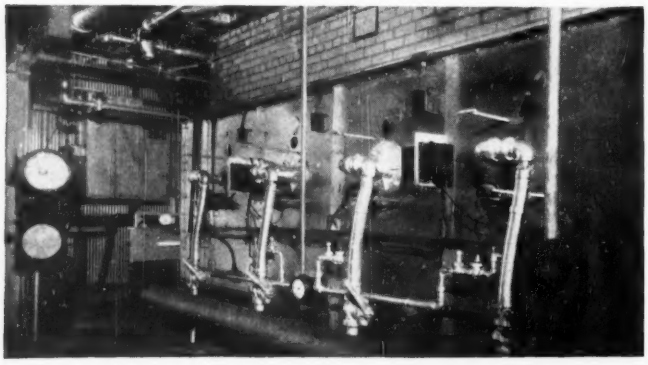
Sid Rankin, Supt. of Dehydration at Texsun emphasizes the importance of retaining color and vitamin value in the finished product, which requires heat-processing at precise temperatures just below the boiling point. Mr. Rankin states—"We could not turn out a product of such high quality without the use of natural gas as it is readily controlled and is very economical. In our patented process in the manufacturing of citrus molasses, natural gas is indispensable."

Texsun has used GAS for heat-processing since the Weslaco plant was built in 1936. These applications of GAS represent some of the important ways in which GAS serves the food industry. Ask your Gas Company Representative about other heat-processing applications in your business.

Battery of Gas-fired dryers from firing end, and showing control panel. Kilns are 90 feet long, with 30 foot firing chambers.



Gas Burner on one of the boilers which generates steam for processing.



MORE AND MORE... THE TREND IS TO GAS

AMERICAN GAS ASSOCIATION

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Catalogs, Bulletins

Food Plant Equipment

Portable Electric Blower

For cleaning equipment of any size of dust, dirt or grit, portable electric cleaners are recommended in 4-page bulletin.—*Breuer Electric Mfg. Co., 5100 Ravenswood Ave., Chicago 40.*

Colloid Mill and Roller Mills

Finer dispersions and emulsions are obtained, reports Bulletin 1301, with triple-action colloid mill. Apparatus can be adjusted during processing of liquids and semi-solids, and working parts can be easily disassembled for cleaning. In addition, high-speed 3-roll mills are detailed in Circulars 1101, 1102, and 1103.—*Troy Engine & Machine Co., Process Machinery Div., Troy, Pa.*

Centrifugal-Pump Seals

Mechanical seals designed for sealing stuffing-boxes in centrifugal pumps handling hot and cold liquids, corrosive or non-corrosive, are delineated in 12-page Bulletin 40-10000.—*Byron Jackson Co., Pump Div., Box 2017, Terminal Annex, Los Angeles 54.*

Tank Heating and Cooling

Embossed metal sheets through which heating and cooling media are circulated are stated, in 6-page bulletin, to cost and weigh less than pipe coil. Reported to increase capacity, they have no threaded joints and are easily cleaned.—*Kold-Hold Mfg. Co., Lansing 4, Mich.*

Electric Blowers and Exhausters

Constant air pressures for furnaces—up to 5,500 cu. ft. per min. and termed economical—are provided by units described and illustrated in Bulletin 3014D. Specifications, capacity tables and diagrams are included.—*Buffalo Forge Co., Buffalo 5, N. Y.*

Retort Loader-Unloader

Work of 7 to 11 men is reported saved with use of retort loader-unloader detailed in 4-page bulletin. In addition, can damage, contamination, and cooking and cooling time are minimized.—*Berlin Chapman Co., Berlin, Wis.*

Proportioning Oil Burner

Single control lever, uniformity of oil/air ratios, close control of work temperature limits, efficient operation with heavy or light oils, and better combustion with fuel savings are said, in Catalog 410, to be major advantages of new oil burner. Attachments, typical installations and controllers are illustrated.—*Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.*

Gas Pumps

Rotary, positive gas pumps, used as boosters or exhausters, are illustrated and described in 8-page Booklet 31-B-17.—*Roots-Connersville Blower Corp., 900 W. Mount St., Connersville, Ind.*

Grinding and Dust Collecting

Precise particle control, in wide range covering a long list of materials, is function of pulverizing equipment detailed in 50-page book. Data on ultra-fine grinding in lower micron ranges and separation of solids from dust-laden air are also included.—*Pulverizing Machinery Co., Chatham Rd., Summit, N. J.*

Filters

Quick-opening tank covers, open or closed slurry feeders, and a leaf-spacing arrangement that eliminates need for removing them for cleaning are among advantages of filters discussed in 6-page illustrated foldout.—*Enzinger Union Corp., Angola, N. Y.*

Continuous Filtration

Filter cakes are lifted and discharged in one continuous sheet with string discharge, which is part of mechanism of continuous rotary vacuum filter covered in 24-page bulletin.—*Filtration Engineers, Inc., 155 Oraton St., Newark 4, N. J.*

Helical Gear Drives

Smaller-size and lower-weight units for speed reduction may now be selected from line of enclosed helical gear drives. Improved gear tooth generation, closer manufacturing tolerances, and reinforced housing design are features reported in 16-page Manual MPA.—*Foote Bros. Gear & Machine Corp., 4545 S. Western Blvd., Chicago 9.*

Vacuum Shelf Dryers

Uniform, low-temperature drying without agitation of the heat and oxygen-sensitive materials is reported accomplished by vacuum shelf dryers described in Bulletin 701. Booklet includes complete specifications.—*F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia 20.*

Centrifugal Pump

Vertical, self-priming centrifugal pump in which contact type of seal is eliminated is detailed in 16-page Bulletin 53. Instructions for installation, and maintenance, also operation information, are given.—*The LaBour Co., Inc., Elkhart, Ind.*

Wear-Resistant Burrs

Grinding mechanism of nickel-alloy burr for corn mill is illustrated and described in house organ, *Nickel Topics*, Vol. 2, No. 11. Also covered are all-stainless low-cost heat exchanger, and stainless water softening tanks.—*International Nickel Co., Inc., 67 Wall St., New York City 5.*

Electronic Metal Detector

Inspection of vegetables, fruits, meats and other food products prior to canning, and of mixed grain before entering the grinding mill, are among applications of electronic metal detector treated in 20-page bulletin. Installation can be made on conveyors with speeds from 15 to 600 ft. per min.—*Allis-Chalmers Mfg. Co., S. 70 St., Milwaukee, Wis.*

Materials Handling

Elevator Cup

Complete discharge of material from elevator bucket of high capacity is reported in information sheet. Air vents in corners of cup for flour and other soft stocks prevent sticking.—*B. I. Weller Co., 327 S. La Salle St., Chicago 4.*

Instructions for Gasoline Fork Trucks

Twenty-five hints on how to operate gas trucks safely with minimum wear to moving parts are contained in 4-page folder. Also

● **Buffalo Weaving and Belting Co.'s new folder "What Conveyor Belts are Available" will help you select the *right* belt for every conveyor operation in your plant. SEND FOR IT TODAY!**

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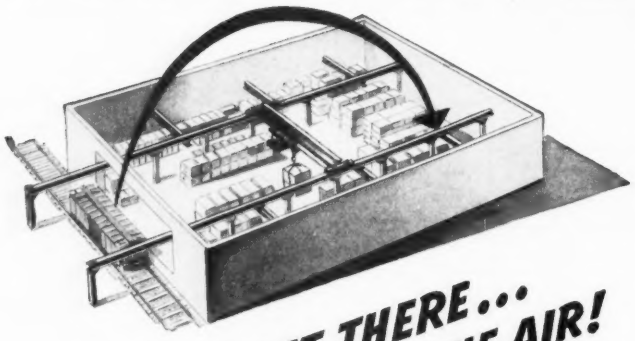

PUT IT THERE... THROUGH THE AIR!

A quick hook-on to a pallet, basket or standard sling and the load is whisked away—cutting across occupied floor space—straight to the spot where you want it.

It's smart, and thrifty to use "through the air" transportation as widely as you can in plants and warehouses. Compare this method for overall cost, efficiency, maintenance and safety before you allow other means of transfer to overlap the service that is best performed by cranes and hoists!

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Makes and sells all three lifting tools for airborne shop loads

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suggested is use of this information in training courses.—*Yale & Towne Mfg. Co., Roosevelt & Haldeman Ave., Philadelphia 15.*

Vibrating Conveyor

Abrasive, lumpy, rough, hot, cold, dry, or wet materials are handled on grades as steep at 10 deg. by mechanical vibrating conveyor delineated in Bulletin 826.—*Jeffrey Mfg. Co., Columbus 16, Ohio.*

Fork Trucks

Electric and gas-electric fork trucks with readily mounted attachments for conversion to special-purpose handling equipment are subject of 20-page Bulletin 25.—*Lewis-Shepard Products, Inc., 264 Walnut St., Watertown 72, Mass.*

Pneumatic Conveying

Flexibility is stressed as a prime advantage of pneumatic conveying, treated in 4-page bulletin.—*Dracco Corp., Cleveland 5.*

Materials Handling Equipment

Box car unloaders, power unloading scoops, screw conveyors, bucket elevators, belt conveyors, oscillating and vibrating conveyors, drives, and bearings are among materials-handling and power transmission equipment illustrated and described in 20-page Book 2305.—*Link Belt Co., 307 N. Michigan Ave., Chicago 1.*

New Fork Lift Trucks

Economically priced 3,000- and 4,000-lb. capacity fork-lift trucks are covered with specifications in 5-page bulletin.—*Baker Industrial Trucks Div., The Baker Raulang Co., 1250 W. 80 St., Cleveland 2.*

Grooved Wheel Casters

Information on "V"-grooved wheel casters for angle iron track is contained in 8-page folder. Tracks can be moved easily.—*The Bassick Co., Bridgeport, Conn.*

Control Equipment

Energy Control

A paper on automatic combustion control, and information on flow meters and pressure regulators are included in house organ, Energy, Vol. 11, No. 6—*Energy Control Co., 5 Beekman St., New York City.*

Recording Oscillographs

Applications, operations, and features of multichannel recording oscillographs are discussed in 16-page bulletin. Sample records of actual applications are presented with detailed assembly drawings.—*Consolidated Engineering Corp., 620 N. Lake Ave., Pasadena 4, Calif.*

By-Pass Valves

Completely assembled, ready-to-use by-pass is reported to save space, maintenance, weight and time. Valves are discussed in Specification Sheet 406.—*Belfield Valve Div., Minneapolis-Honeywell Regulator Co., Philadelphia 44.*

Self-Contained Temperature Control

Temperature is measured by means of a remote-bulb thermal system, while motor-driven control valve is operated electrically to maintain desired temperature in tanks, ovens, dryers, heaters, kettles and refrigerating and air conditioning units, says new information sheet. Controller is stated to be economical in cost and easy to install.—*Brown Instru-*

Winery Toasts

PERVENAC*

Dry Labeling

Because it Improves Appearance, Saves Money!

FOR gaining customers, lowering costs, or winning labeling awards, East-Side Winery of Lodi, California finds Pervenac* ideal for its new Royal Host labels.

They comment: "Our experience in labeling Gold Bell proved that 'dry-labeling' made for better appearance and saved us money, since there is no cost for wiping excess glue from the bottles or straightening labels and there is no time lost, as before, in preparing glue pots in the morning or cleaning up at night."

Like wines, so have beers, pharmaceuticals, jet engine parts and many other products from toys to toiletries switched to *positive, clean* and *speedy* Pervenac* dry labeling!

Nashua's Pervenac* will solve tough labeling problems (on wet or dry glass, paper, plastics or metal). Write, today, to your nearest distributor or to us at Nashua.

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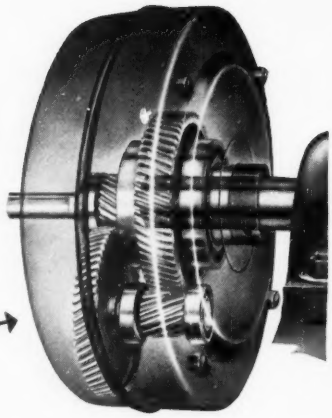
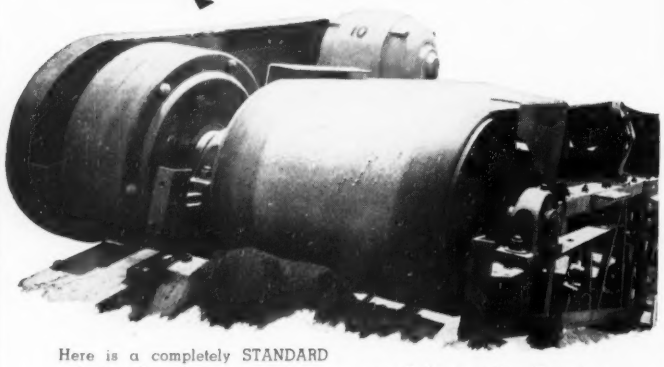
REDUCTION DRIVES
give you
SLOW SPEEDS
at LESS COST!





Here is a completely STANDARD reduction drive that can transform your special, slow-speed problems into simple, efficient high-speed installations . . . using STANDARD motors, STANDARD V-Belts, STANDARD sheaves—all available from distributors' stock. It's lower in first cost, less expensive to install; no special engineering is necessary. Six sizes of Reduction Units give you any speed below 154 rpm for drives up to 25 hp. Here's an amazingly different slow-speed drive—IT PUTS THE GEARS WHERE THEY BELONG—*right on the shaft of the driven machine!* Over 50,000 are already paying their way throughout industry.

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ments Div., Minneapolis-Honeywell Regulator Co., 4458 Wayne Ave., Philadelphia 44.

Cloudiness in Liquids

Photoelectric device which provides continuous detection of cloudiness or suspended solids in liquids or gases in concentrations of less than 1 ppm. is subject of 2-page bulletin. Instrument operates in continuous processing lines.—*Electric Eye Equipment Co., Danville, Ill.*

Impulse Timer

For continuous repeat of impulse signals, or to operate current on and off in equal periods of time, impulse timer without gears and clutch is recommended in 4-page Catalog 142. Interval, process and multiple circuit timers are also illustrated and described.—*Zenith Electric Co., 152 W. Walton St., Chicago 10.*

Plant Supplies

Pipeline Strainers

Dirt, chips, scale and packing shreds are prevented from clogging steam traps and reducing valves by variety of strainers covered in Bulletin S-202. Woven and perforated screens are available in different materials and sizes.—*Yarnall-Waring Co., Chestnut Hill, Philadelphia 18.*

Maintenance Coating

Vinyl coating goes over damp surfaces and rusted pits, eliminating sand blasting, and gives high resistance to fumes, spillage, abrasion, flames, and fungi, reports 4-page bulletin. Suggested uses of coating and materials to which it is resistant are listed.—*Wilbur & Williams Co., Boston 15.*

Factory and Office Shelving

Heavy- and light-duty shelving, safes, wardrobe and storage cabinets, waste receptacles, trucks, rotating bins, and seats for different purposes are among steel units featured in 12-page catalog.—*Precision Equipment Co., 3714 N. Milwaukee Ave., Chicago 41.*

Machinery Lubricants

Guidance in the application of lubricants to industrial and automotive machinery, including specifications and recommendations, is presented in 30-page Form C10L. Saving of 10 percent in lubricant cost is reported.—*Keystone Lubricating Co., 21, Clearfield and Lippincott Sts., Philadelphia 32.*

Cleaning and Sanitizing

Germicidal technics, descaling procedures, deodorants, bottle and case conveyor lubricants, rust preventives, and paint stripper are among subjects covered in comprehensive 32-page booklet on food plant cleaning.—*Oakite Products, Inc., 126G Thames St., New York City 6.*

Miscellaneous

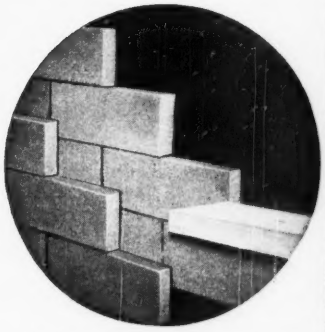
Glass-Fiber Products

Testing facilities and methods used on Fiberglas products are handsomely illustrated and described in 36-page book. Data on properties, uses, and performance characteristics are given. — *Owens-Corning Fiberglas Corp., Wayne Bldg., Toledo 1, Ohio.*

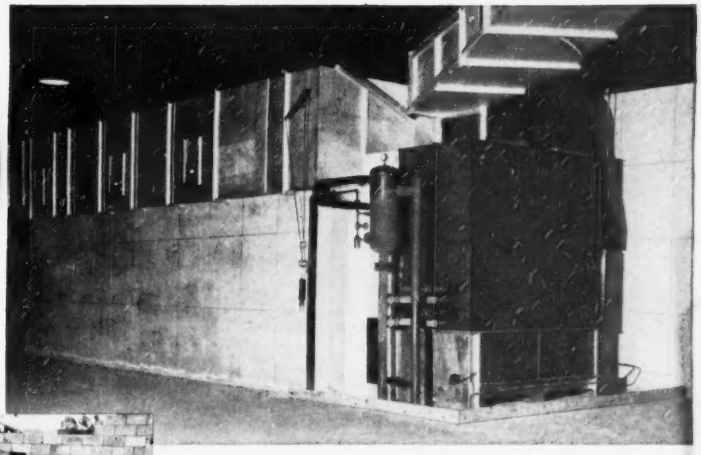
Lab Apparatus

Precipitate heater, nester clamp for irregular glassware, rod holder, and sample pulverizer are among laboratory apparatus fea-

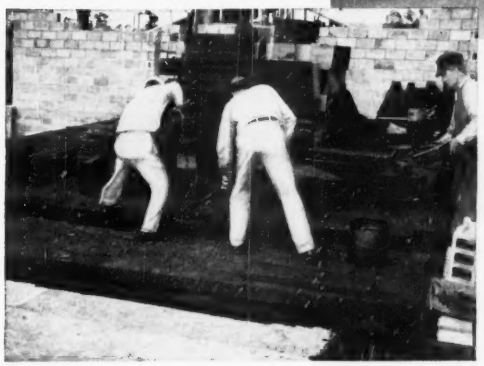
MUNDET CORKBOARD PROTECTS *Quick Frozen* CITRUS CONCENTRATES



Progress picture shows alternating layers of corkboard being applied to wall of freezer storage.



Mundet Corkboard insulates this freezer storage room in new plant addition of Plymouth Citrus Growers Association, Plymouth, Florida.



Above: Mundet Corkboard is being applied to roof over freezer tunnel in modern plant of Polk Packing Association, Winter Haven, Florida. The carefully guarded quality of Polk Packing insures the fame and appeal of frozen concentrates.

THE fast growing demand for frozen orange juice concentrates has caused Plymouth to enlarge its quick freezing plant. Mundet Corkboard is chosen to protect the delicious flavor and freshness of Plymouth-frozen juices, with installation in additional freezer storage and extension to freezer tunnel • • • View above shows refrigeration blast unit and section of duct that delivers air from refrigerating equipment to tunnel and from there to storage room. Special construction permits utilization of air from tunnel with resulting economies.

Mundet Corkboard for both of the installations shown here was supplied thru our Atlanta office. Convenient Mundet branches in many cities are staffed with competent specialists, ready to give money-saving services to packers, food processors and other users of low temperature. Write for details to Mundet Cork Corporation, Insulation Division, 7101 Tonnelle Avenue, North Bergen, N. J.

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CORK INSULATION

ATLANTA: 339-41 Elizabeth Street, N.E.
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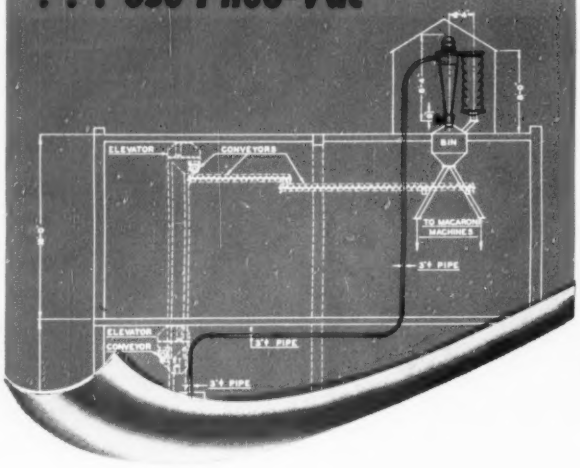
Write us for name of our nearest representative if there is no Mundet office in your city.

How to handle BULK FLOUR *without contamination* . . . use Pneu-Vac



The above typical installation shows how flexible Pneu-Vac pipeline replaces all cumbersome bucket elevators and screw conveyors - guarantees more sanitary operation.

Never before have such efficient, sanitary methods for handling bulk flour been available to the milling industry. With PNEU-VAC, every inch of the conveying system is swept absolutely clean . . . no flour remains dormant to harbour infestation.
With its cost justified by sanitary standards alone, PNEU-VAC offers even more:

- Flexible installation economies.
- Lower maintenance costs compared with outmoded screw conveyors and bucket elevators.
- Elimination of dust improves working conditions . . . cuts production losses.

Learn how a Pneu-Vac System can prevent contamination in your plant . . . save you money through more efficient handling methods. Every System is designed to meet your individual capacity requirements. Write for Bulletin 18-B today! Sprout, Waldron & Co., Inc., 26 Waldron St., Muncy, Pa.

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121

tured in house organ, *Precisionomics*, Vol. 1, No. 2—*Precision Scientific Co.*, 3737 W. Cortland St., Chicago 47.

Stainless Steel Equipment

Dairy, beverage, ice cream and candy plants can use stainless steel boxes, truck linings, tanks, peanut oil dispensers and cookers illustrated and described in 8-page leaflet.—*The John Van Range Co., Fifth & Butler, Cincinnati 2.*

Mass Spectrometer

Application of mass spectrometer to use and measurement of stable, rare isotopes is explained in 8-page bulletin. Isotope-tracer and isotope-dilution tecinics are described, and list of typical stable isotopes and their uses is given.—*Consolidated Engineering Corp., 620 N. Lake Ave., Pasadena 4, Cal.*

Vehicular Fire Extinguishers

Silicon bronze fire extinguisher for trucks and other vehicles is covered in information sheet.—*The American LaFrance-Foamite Corp., Elmira, N. Y.*

Insulation in Industry

Subject of feature article in house organ, *Insulator*, Vol. 19, No. 4 is frozen concentrated orange juice. Flow diagrams and photos are included.—*Armstrong Cork Co., Lancaster, Pa.*

Ball Bearings

Belt and trolley conveyors will benefit from installation of sealed, lubricated-for-life ball bearings, says 16-page illustrated book.—*New Departure Div., General Motors Corp., Bristol, Conn.*

Tools for Valve Maintenance

Heat-treated alloy steel seat ring wrenches for valve maintenance are delineated in Circular 579.—*The Lunkenheimer Co., Beekman & Waverly Aves., Cincinnati 14.*

Fire Information

Articles on preventing industrial fires get monthly coverage in house organ, *Loss Control*.—*American Mutual Liability Insurance Co., 142 Berkeley St., Boston 16.*

Venturi-Ball Valves

Operation and engineering data on complete line of venturi-ball valves are given in 16-page Catalog 103. Whistle valves, bar stock valves, cast steel and stainless steel valves operated by variety of mechanisms are inclued.—*Paul Valve Corp., 683 Third Ave., New York City 17.*

Engineering Services

Manufacturer of completely equipped plants, production lines, special machines and heat-processing equipment explains company's facilities for such work in 12-page Booklet 127.—*Continental Industrial Engineers, Inc., 176 W. Adams St., Chicago 3.*

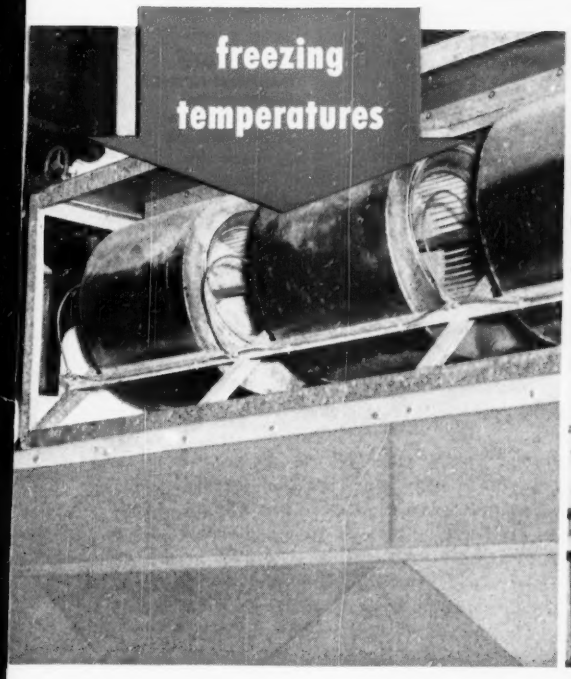
Electrical Equipment

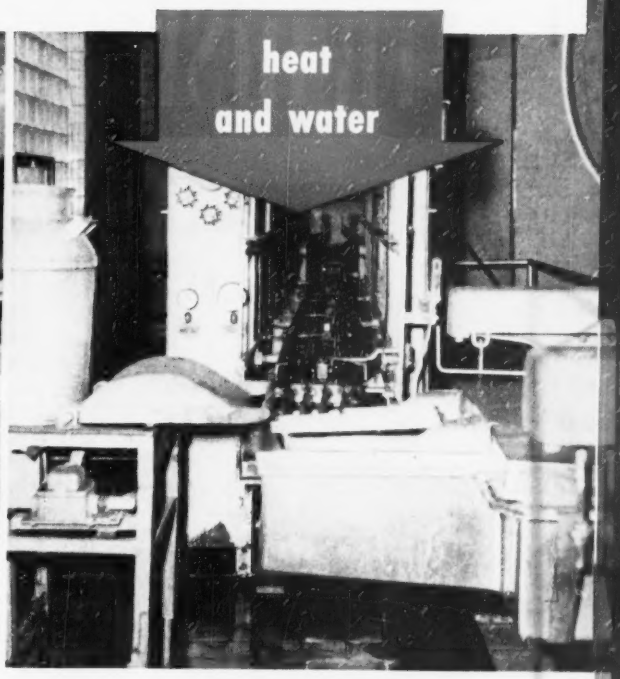
Care of rotating a.c. equipment and ways to locate trouble in control systems, also information on instrument standards and details of circuit breakers, are the subject matter of articles in house organ, *Electrical Review*, fourth quarter, 1949.—*Allis-Chalmers Mfg. Co., S. 70 St., Milwaukee, Wis.*

Self-Lubricating Bushings

Metal-impregnated graphite bushings are self-lubricating, therefore oil does not contaminate food products, reports 8-page booklet.—*Graphite Metallizing Corp., Yonkers, N. Y.* —*End*

Here's ONE grease that withstands





Bearings in electric motors and fan shafts in a midwest cold storage plant are exposed to storage-room temperatures of 32° down to −10° F. The grease, applied by pressure gun, has to flow through ¼" copper tubing to reach the bearings. At the low temperatures, conventional greases continuously gave application and lubrication troubles.

The problem was solved by Stanolith. Despite freezing temperatures, this unique product flowed readily through the tubing and provided safe lubrication for the bearings.

Bearings in the can-washing equipment shown above are subjected to the severe washing action of water at near-boiling temperatures of 180° to 200°F. This combination of heat and water proved too severe for conventional greases and posed a lubrication problem in this midwest plant.

At the suggestion of a Standard Oil Lubrication Engineer, the job was given to Stanolith Grease, a lithium soap product with the unique ability to withstand both heat and water.

In six months' service, Stanolith has provided trouble-free lubrication for the bearings. Moreover, Stanolith has been used successfully for lubrication of bearings in the plant's electric motors and conveyor systems. Its versatility has eliminated the cost and trouble of stocking special lubricants.

Stanolith Grease

If heat, water, or low temperatures interfere with proper lubrication in your plant, try Stanolith Grease. A Standard Oil Lubrication Engineer will be glad to give you more information about this versatile product.

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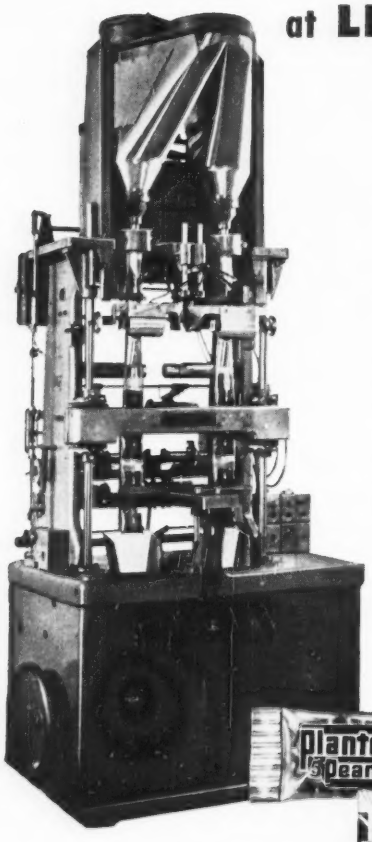

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TRANSWRAP is equally efficient for powders, solids, tablets and even liquids. Standard packaging materials which may be used include cellophane, Pliofilm, glassine, roll foil or other suitable heat-sealing materials. Package capacities range up to 80 cubic inches in volume and often may exceed one pound in weight. Custom-engineered adaptations are possible to meet your individual requirements with maximum efficiency.

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Cottonseed Oil Extracted by Use of Monohydric Alcohol Having Up to Three Carbon Atoms per Molecule in Presence of Alkali Metal Soap at Temperature Between About 40 Deg. C. and Boiling Point of Solvent for at Least 10 Min.—*A. Perez, to Phillips Petroleum Co. No. 2,485,916. Oct. 25, 1949.*

Ice Cream Stabilized by Addition of Small Quantity of Propylene Glycol Ester of Alginic Acid to Mix—*A. B. Steiner and G. D. Sperry, to Kelco Co., San Diego, Calif. No. 2,485,935. Oct. 25, 1949.*

Glyceride Oils Containing Vitamin A and Provitamin Carotene Stabilized Against Oxidation by Addition of Fraction of Percent of Ammonium Gallates or Substituted Ammonium Gallates—*J. Korner, to Silmo Chemical Corp., Vineland, N. J. No. 2,486,177. Oct. 25, 1949.*

Hot Foods Packaged in Cartons—*B. O. Keuhlhorn, Chicago. No. 2,486,178. Oct. 25, 1949.*

Sundaes Packaged in Paper Cup in Manner to Prevent Seeping of Fluid Topping Through Joint Between Cup Wall and Cover—*F. T. Moser, to Limpert Bros. Inc., Vineland, N. J. No. 2,486,194. Oct. 25, 1949.*

Crowns Mechanically Trimmed From Pineapples in Continuous Manner—*J. Abrey, J. T. Munro, and J. T. Youd, to Hawaiian Pineapple Co., Ltd., Honolulu. No. 2,486,367. Oct. 25, 1949.*

Cellular Organic Materials Finely Ground, Heated to Destroy Fat-Splitting Enzymes, Cooled to Below 50 Deg. C. and Subjected to Enzymic Protein Degradation for Recovery of Fat Content—*J. W. Beckman to M. O. Palmer, Oakland, Calif. No. 2,486,384. Nov. 1, 1949.*

Organic Material Finely Ground and Subjected to Controlled Enzymic Fermentation for Release of Oil Content—*J. W. Beckman to M. O. Palmer, Oakland. No. 2,486,385. Nov. 1, 1949.*

Wheat, Barley and Rye Containing Inactive Diastase Steeped Whole in Water Containing Amylase Activators to Stiumulate Diastase to at Least 80 Percent of Total Power—*V. L. Erlich, to Red Arrow Malting Co., Milwaukee, Wis. No. 2,486,396. Nov. 1, 1949.*

Edible Fatty Oil Stabilized by Addition of Small Quantity of Citric Acid and Heating at From 150 to 250 Deg. C.—*F. A. Lindsey, Jr. and W. T. Maxwell to The Southern Cotton Oil Co., Savannah, Ga. No. 2,486,424. Nov. 1, 1949.*

Soya Oil in Organic Solvent Treated With Absorbent to Obtain Tocopherol Content Preparatory to Making Concentrate With High Vitamin E Potency—*K. C. D. Hickman and L. Weisler to Distillation Products, Inc., Rochester, N. Y. No. 2,486,540. Nov. 1, 1949.*

Soya Oil Treated to Recover Mixture of Tocopherols and to Convert Delta-Tocopherol Content to Alpha-Tocopherol—*J. G. Baxter, M. H. Stern, and L. Weisler to Distillation Products, Inc., Rochester, N. Y. No. 2,486,541. Nov. 1, 1949.*

Glyceride Fats Split in Course of Counter Current Flow Through Tower Under High Pressure and High Temperature Against Relatively Hot Water Perculating Downward—*A. C. Brown to Emery Industries, Inc., Cincinnati, O. No. 2,486,630. Nov. 1, 1949.*

Higher Fatty Acids and Low Molecular Weight Monohydric Alcohol Esterified in Continuous Process by Aid of Strong Mineral Acid Catalyst—*W. R. Fish, to Swift & Co., Chicago. No. 2,486,938. Nov. 1, 1949.*

Dehulled Oats, Ground to Pass 60 Mesh Screen, Added to Sponge Cake Mix—*S. Musher to Musher Foundation, Inc., New York City. No. 2,487,069. Nov. 8, 1949.*

Acid-Hydrolyzed Starch Heated With Calcium Aluminate, Sodium Aluminate or Sodium Silicate to Produce Extra Sweet, Light Colored Corn Syrup Free From Harsh and Bitter Taste Elements—*W. R. Fetzer, and J. W. Evans, to Union Starch & Refining Co., Columbus, Ind. No. 2,487,121. Nov. 8, 1949.*

Milk and Cream Tested for Sediment by Mechanism Designed to Force Predetermined Quantity Through Filter Disk—*N. C. Kottkamp and P. J. Bailey, to Langsenkamp-Wheeler Brass Works, Inc., Indianapolis. No. 2,487,248. Nov. 8, 1949.*

Confections Formed by Deposition Into Molds Mounted on Endless Conveyor, on Which Closures are Mechanically Placed Before Beginning of Travel in Opposite Direction and in Inverted Position—*H. E. Bianchi, to G.*

To Help You Improve Quality and Cut Costs

In Processing—New applications of instruments to food processes—with emphasis on automatic control—will be described and illustrated in a 12-page special report in the March issue of FOOD INDUSTRIES. This report will tell you about new types of instruments and auxiliary apparatus which make quality control easier and more precise—and which reduce processing costs.

In Packaging—Better packages and more efficient packaging-line operations have resulted from new developments in methods, machines, materials and containers. These developments will be discussed in a special report in the April issue of FOOD INDUSTRIES. Product quality and consumer appeal can be enhanced—and operating costs can be cut—through use of proper packages and faster packaging equipment.

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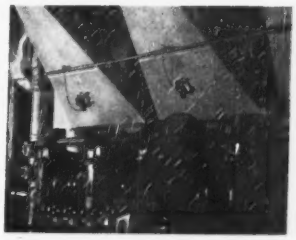

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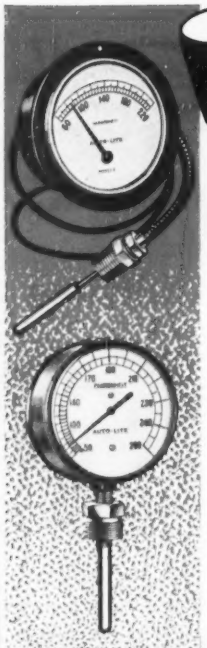

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Cella, Inc., New York City. No. 2,487,417. Nov. 8, 1949.

Apples Sliced in Machine Equipped With Knife Head Containing Series of Horizontally Positioned Slicing Knives Operating Through Parallel Vertical Planes—*J. B. Floyd, Hilton, N. Y.* No. 2,487,431. Nov. 8, 1949.

Packaged Food Frozen in Trays Stacked in Manner to Permit Passage of Air at Subfreezing Temperatures—*V. C. Patterson to York Corp., York, Pa.* No. 2,487,584. Nov. 8, 1949.

Glycerine Obtained by Transesterification of Fatty Material Refined by Neutralizing With Alkaline Earth Hydroxide or Oxide and Heating with Ammonium Halide—*F. J. Sprules and Raymond Liebing, to Nopco Chemical Co., Harrison, N. J.* No. 2,487,610. Nov. 8, 1949.

Glycerine Obtained by Transesterification of Fatty Material Refined by Neutralization With Alkaline Earth Carbonate and Treatment with Alkaline Earth Halide—*F. J. Sprules and R. Liebling, to Nopco Chemical Co., Harrison, N. J.* No. 2,487,611. Nov. 8, 1949.

Topping for Salads and Desserts Containing Vegetable Protein, Vegetable Carbohydrate, Refined Vegetable Fat, Emulsion Stabilizer, and Water Made to Hold Predetermined Quantity of Air When Whipped—*H. W. Diamond, Dearborn, Mich.* No. 2,487,698. Nov. 8, 1949.

Crude Glutamic Acid Produced by Alkaline Hydrolysis of Steffens Filtrate, Purified by Treatment With Non-Oxidizing Mineral Acid Solution and Adjustment of Precipitate-Free Solution to pH Between 3.1 and 3.3 Followed by Cooling, Agitating and Recovery of Glutamic Acid Crystals—*R. W. Stenehjem and R. E. Cox, to International Minerals and Chemical Corp.* No. 2,487,739. Nov. 8, 1949.

Alkalized Lignin Added to Steffens Filtrate Solution After Hydrolysis to Aid Recovery of Glutamic Acid—*M. J. Blish, to International Minerals & Chemical Corp.* No. 2,487,785. Nov. 15, 1949.

Tannin Added to Solution Containing Glutamic Acid and Organic Impurities From Alkaline Hydrolysis of Steffens Filtrate to Aid Recovery of Glutamic Acid Content—*F. A. Hoglan, to International Minerals & Chemical Corp.* No. 2,487,807. Nov. 15, 1949.

Solid, Edible, High-Fat Content Mixture Capable of Withstanding Dry Heat Without Melting Made to Consist of Fat, Non-Crystallizable Powdered Material, Sugar, and Small Percentage of Water—*H. Lataner, Vinton, Va.* No. 2,487,931. Nov. 15, 1949.

Fish Cleaned, Dried, Boiled, Redried and Chilled Before Being Deboned and Ground, Mixed With Seasoning, Made Into Paste With Liquor From Boiling Step, Stuffed Into Casings and Frozen Solid in Manner to Prevent Formation of Ice Crystals—*J. W. Wexler, Silver Spring, Md.* No. 2,487,957. Nov. 15, 1949.

Dough Extruded Continuously Onto Moving Conveyor Through Nozzle Fitted With Wire Cut-Off Operating With Reciprocal Action Actuated by Mechanism Controlling Movement of Conveyor Belt—*F. C. Werner and D. Sporte, Grand Rapids, Mich., to F. C. Werner.* No. 2,488,046. Nov. 15, 1949.

Cheese Curd Mechanically Cut and Handled Without Matting by Device Suspended From Overhead Trolley—*E. C. Damrow to Damrow*

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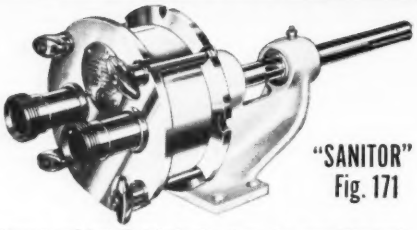

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Brothers Co., Fond du Lac, Wis. No. 2,488,053. Nov. 15, 1949.

Mixture of Plant Hormone and Powdered Carrier Applied to Hearts and Leaves of Pineapple Plants to Delay Differentiation—*F. P. Mehrlich to Hawaiian Pineapple Co., Ltd., Honolulu.* No. 2,488,092. Nov. 15, 1949.

Chocolate-Coated Confections Mechanically Transferred From Enrober Conveyor Apron to Spaced Trays on Traveling Cooler Conveyor by Use of Supporting Flexible Plaques—*A. A. Tunley, to Baker Perkins, Ltd., Peterborough, England.* No. 2,488,104. Nov. 15, 1949.

Meat Formed Into Block, Packaged in Container With Electrically Conductive End Walls and Subjected to High Frequency Current to Raise Temperature of Central Portion of Block to Processing Level Preliminary to Subsequent External Heat Treatment With Steam to Process Outer Portions of Block and Obtain Uniform Processing Throughout—*J. Bowman to Trustees for American Meat Institute Foundation, Chicago.* No. 2,488,164. Nov. 15, 1949.

Meat Formed Into Mass of Predetermined Size, Wrapped With Parchment Paper and Placed in Open-Ended Insulating Container Between Pair of Electrodes for Application of High Frequency Current to Develop Processing Temperatures Throughout Central Portion of Mass Preliminary to Cooling, Removing Wrapped Meat From Container and Sealing in Can for Further Heat Treating to Obtain Uniform Processing Throughout Mass—*J. Bowman and B. W. Beadle to Trustees for American Meat Institute Foundation, Chicago.* No. 2,488,165. Nov. 15, 1949.

Shrimps Soaked in 2 Percent Dibasic Sodium Phosphate Solution for About 2 Hr. Preliminary to Cooking in Boiling Brine—*G. Garnatz, N. H. Volle and F. E. Deatherage to The Kroger Grocery and Baking Co., Cincinnati.* No. 2,488,184. Nov. 15, 1949.

Eggs Mechanically Sorted and Positioned for Packing or Cartoning—*C. Page to Page and Cox, Detroit.* No. 2,488,230. Nov. 15, 1949.

Egg Whites Separated From Yolks During Passage Through Inclined Chute Fitted With Slots—*G. L. Lane, Glendale, M. Lichtenfeld, Los Angeles, and John B. Austin, Glendale, Calif.* No. 2,488,473. Nov. 15, 1949.

Chilled Butter Blocks Mechanically Cut Into Individual Service Pats With Device Equipped With Heated Blade to Aid Delivery of Pats to Rotating Ejector—*M. A. Berg, Oakland, Calif.* No. 2,488,656. Nov. 22, 1949.

Darkening of Vegetable Drying Oil Inhibited by Treatment With Oxygen-Containing Gas—*I. J. Novak, to Raybestos-Manhattan, Inc., Passaic, N. J.* No. 2,488,680. Nov. 22, 1949.

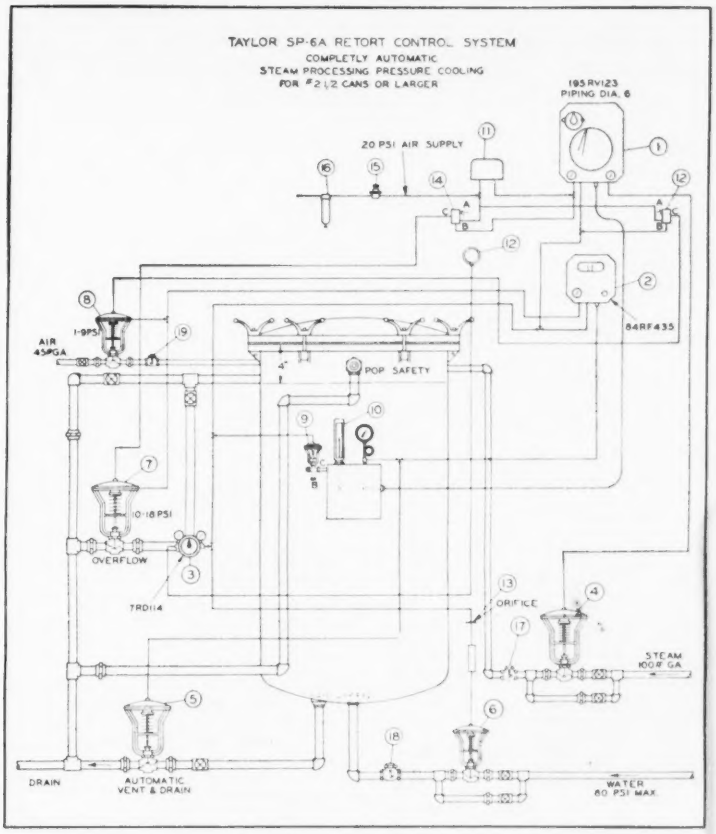
Solids in Liquids and Starch in Tailings Containing Water, Starch and Gluten Separated in Continuous Manner by Centrifuging—*G. J. Strezynski, to De Laval Separator Co., New York City.* Nos. 2,488,746 and 2,488,747. Nov. 22, 1949.

Grain Dried Under Automatic Draft-Controlled Conditions—*A. B. Welty, to International Harvester Co.* No. 2,488,753. Nov. 22, 1949.

Sugar Juice Clarified in Tank Consisting of Plurality of Superimposed Settling Trays Forming Clarification and Flocculation Compartments—*E. M. Copp, to Graver Tank & Mfg. Co., Inc.* No. 2,488,851. Nov. 22, 1949.

—End

Want to get 20% more cases per retort per day?



IT IS BEING DONE with a Taylor SP-6A Retort Control System. Above you see how this completely automatic venting, temperature, time and pressure control system is applied.

The SP-6A Retort Control System is designed to handle No. 2½ cans or larger. The operator's responsibility ends once he has loaded his retorts and turned a timer dial.

HERE'S HOW TAYLOR ACCURACY TAKES OVER WITH:

Automatic venting.

Automatic temperature control at processing point.

Automatic timing of process period with steam being automatically shut off at the end of this period.

Automatic pressure control during cooling by economical use of compressed air in retort.

Consistently uniform cooling to a specified temperature.

Termination of cooling at a specified point (above), with automatic blow-down and drain of retort.

Signal flash telling operator cycle is completed.

This Taylor SP-6A Retort Control System is another reason why we say, whatever your processing problem is, we can supply dependable Taylor Automatic Control to help solve it. Your Taylor Field Engineer is ready to show you how to keep costs down and quality up. Ask him! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

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Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

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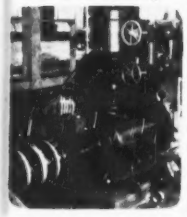

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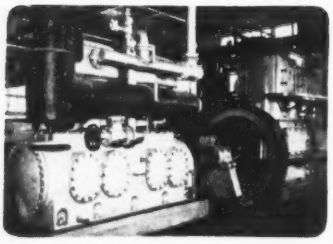


Your Packaging

—Continued from page 47

been developed and the committee has decided to make an experimental production run of these packages of meat balls, the next step is up to the engineering department. A layout for processing and packaging the frozen pre-cooked meat is planned, and the necessary equipment assembled. After the sales department agrees upon the quantity to be produced, the production department begins the experimental run.

This experimental production serves to: (1) Work out operational difficulties, (2) furnish data on production costs, and (3) provide important sales information.

It is but a short step from experimental to actual production. As indicated in Chart II, another call on the engineering department may be necessary when full scale commercial production is begun. After the new product has been on the market for a while, further facts likely will come to light, necessitating return to experimental production to work out the new details.

And so it is seen that evolution of a new product or package is no simple task. It takes much work, cooperation, and coordination, not to mention ingenuity. And the need for a packaging committee—with a first-class chairman—is evident.

Package Testing

The function of a typical packaging laboratory is to evaluate packaging materials on the basis of both performance tests and physical tests. True gage of a packaging material is the way it measures up on the firing line of daily conditions. In the evaluation of a packaging material on the basis of performance, conditions of preparation, packaging, operations, handling and marketing are pre-determined for each product. These conditions are simulated in the laboratory, and the package is exposed to them. If a package passes these tests satisfactorily, actual shipping tests are made to see how the package and shipping container hold up.

Examination of products and packages subjected to performance tests must be scientific. Several factors must be considered in evaluating the quality of the product and condition of the packaging material. A statistical means of evaluation should be set up so that results really mean something. This can be done by carefully working out suitable score sheets in which all factors are considered.

Finally, a satisfactory packaging material is submitted to the physical-testing section of the laboratory, where the various physical data are obtained. Purchase specifications are based on these data, and purchases are checked by this section to see if they meet specifications.

A word regarding personnel for the packaging laboratory: Backbone of this group should consist of persons trained in chemistry and bacteriology. Intelligent persons with plant experience are also useful for doing the necessary leg work and assisting in experimental production runs and shipping tests.

The above article is based on a talk presented at the Illinois Institute of Technology as part of a Graduate School course, Food and Packaging Materials and Methods, offered by the Department of Food Technology and Engineering.

—End—

9-Point Plan

—Continued from page 53

the necessary processing adjustments made, production of the new toffees begins.

Role of Roaming Inspectors

Still cautious of something going wrong with the quality of candies during production, the company employs two roaming inspectors to handle the seventh quality-control step. One's job is to go from department to department, examining confections being processed and looking for evidence of mishandling. Any serious deviation from standard practices is immediately brought to the attention of the chemists and director of formulas and quality control. And steps are immediately taken to correct such deviations.

This man also inspects equipment and the walls, floors, and ceilings of the plant for evidence of poor housekeeping.

When this inspector detects infestation on equipment, he also reports to the chemists. Then, arrangements are made for the engineering department to dismantle the equipment so that the exterminator can spray the equipment.

And that's not all. This inspector also looks for equipment that is starting to break down—splintered wooden paddles, rusty, corroded utensils, and the like. He also searches out personnel with dirty hands and fingernails as well as those who are wearing nail polish.

Each day, this inspector collects samples of uncoated creams from production lines, takes them to the kitchen, and submits them to the director of formulas and quality control. These samples are examined, and if the qual-

ity is not satisfactory, production is stopped and the offending centers are scraped, after the good centers are sorted from bad ones.

The rejected pieces go to the salvage department, where sugar is recovered. This system of sorting has cut down the amount of rejected centers to approximately one-third.

Now to the second roaming inspector: He checks on weight, size, and inperfections of centers before and after they are coated—looking for "misshapes," "improperly coated pieces," "imperfectly coated bottoms," "twins," "tails," "no strokes," and "crushed bottoms." If there is any question about quality, he takes the samples to the vice president in charge of manufacturing. And should the latter deem the candy unacceptable, production is stopped.

Here, there is a double inspection on quality—the eighth control practice. For first the director of formulas and quality control conducts a routine check in the kitchen, and then the vice president in charge of manufacturing examines the confections.

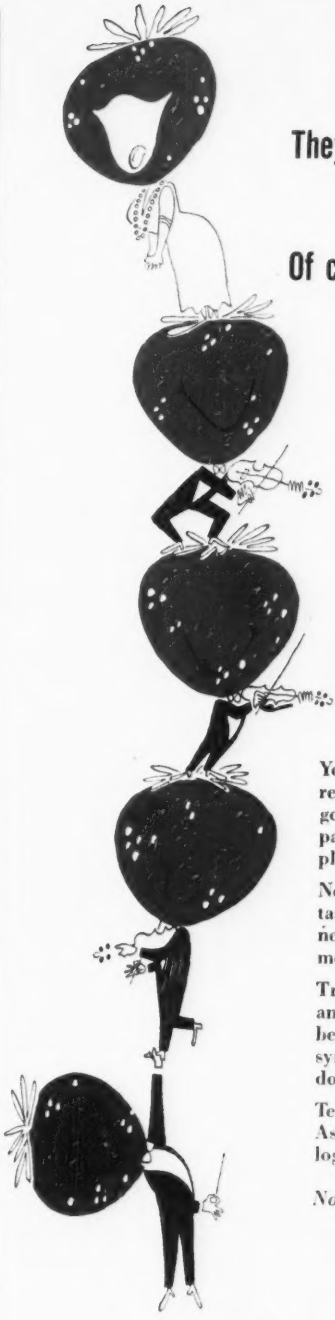
Better Sanitary Methods

Finally, we come to the ninth quality-control measure. Advanced practices have been adopted to eliminate all insects and rodent harborages to safeguard quality. Accordingly, steps have been taken to—

1. Rebuild cabinets, lockers and similar units so that there are no enclosed areas between the floor and the lower shelf of a cabinet or the bottom of lockers. Cabinets and lockers have been raised off the floor to avoid nesting areas. Thus, all areas above the floor are now readily accessible for inspection and cleaning by porters.
2. Tear down "partition" walls and replace them with solid, concrete ones.
3. Fit all doors so that the bottom is flush with the floor.
4. Make sure all windows are tight-fitting.
5. Seal off all holes or breaks in walls, floors, ceilings and around pipes.
6. Store raw material and processed ingredients on skids, 8 in. above the floor and 12 in. away from walls.
7. Keep metal disposal containers covered at all times.
8. Screen all ventilation outlets and openings to sewers.

In addition, insects have been kept out of the plant by this 7-point program:

1. Insect harborages have been eliminated by the same measures as used against rodents.
2. Raw materials are fumigated before entering the plant.
3. Equipment has been designed for quick dismantling, inspecting, cleaning and reassembling (see full details



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TYPE "S-A-L"
(Large capacity burner similar to TYPE "S-A-R") is adaptable in combination with powdered coal burners in large boilers.

TYPE "S-A-R"
(Where steam, or gas is available for atomizing) safely and efficiently burns residuums obtained from process.

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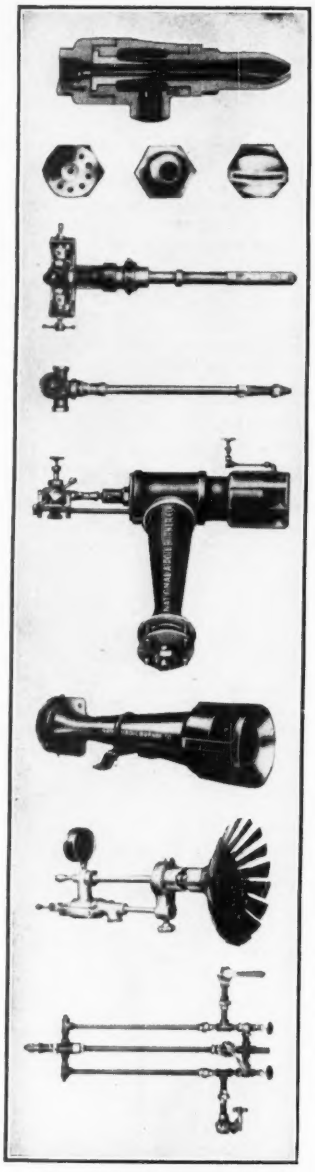

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in article "Quick-Way Sanitation," January FI).

4. Locker rooms are frequently sprayed with suitable insecticides.

5. Suggestions are given to employees on methods of controlling insects in their own homes.

6. A routine system of spraying the entire plant has been set up, using the latest and most effective insecticides.

7. Sinks have been moved away from walls.

—End—

Stored Apples

—Continued from page 66

practicality of a 2-min. treatment with steam at atmospheric pressure in eliminating viable penicillium spores. A preliminary washing, using a high-pressure spray to remove adhering apple tissue, eliminates the possibility of viable spores remaining with such tissue where they are inaccessible to the steam.

Delay between picking and storage times is another significant factor in reduced storage life of apples. Under adverse conditions, this delay may range from several days to even one or two weeks, and may result in increased scald and decay. In the case of scald, penetration below the surface of the apple results in failure of the paring machine to satisfactorily peel the fruit. This causes increased costs in both material and labor.

Pertinent data as to damage from this source are given in Table IV.[7] In this table, comparison is made between immediate and delayed storage of apples with regard to the percentages of bad scald and decay at withdrawal and also at ten days after withdrawal. Northwestern apples were used. The storage-holding periods extended 7½ months, during each of the seasons from 1911-12 to 1914-15.

Precooling of the apples before storing is advisable as an aid in bringing their temperature down to 30-32 deg. F. as quickly as possible after picking. This reduces the load on the storage refrigeration equipment and shortens the time necessary to bring all the fruit down to the required temperature. Holding of apples in large compact stacks outside the packing house is not recommended. Two USDA photos (from Circ. 659) are presented at the beginning of this article to illustrate right and wrong procedures in such temporary storage.

If the fruit cannot be taken directly to cold storage after picking, it is sometimes held overnight in the orchard. In the latter case, it should be placed in a spot free from direct sun exposure,

FACTS ON FILTERING

Representative case histories on widely varied clarification problems condensed from field reports of Johns-Manville Filtration Engineers

$127.50 Monthly Profit from Orange Oil Formerly Lost

(reported by J-M Engineer H. G. Martin)

LOS ANGELES DISTRICT: A citrus processor in my territory uses high-speed centrifuges for orange oil recovery. After two weeks' operation, there is an accumulation of about 100 gallons of sludge, which has a high content of orange oil. Settling and decanting this sludge yields 75 gallons of oil. By adding Celite to the remaining 25 gallons of heavy sludge formerly discarded and then pressing it, 5 more gallons of orange oil are recovered. Selling for $1.50 per pound, this means a saving of $130.00 in additional orange oil per month. Deducting $2.50 for the cost of Celite used, the operation shows a monthly net profit of $127.50.

Sales Appeal Improved with Celite 545

(reported by J-M Eng. W. A. Reschke)

CHICAGO DISTRICT: A trial run convinced this customer that he had much to gain and nothing to lose by using Celite as a pressing aid in making jelly from frozen grapes.

The equipment used was a vertical hydraulic press. Previously, without Celite, the centrifuges had to be cleaned 3 times a day. With Celite, they required cleaning only once a day. Customer also noted that the cloths were in better condition after pressing with Celite. Production of juice remained about the same, but the jelly was much clearer—it had better sales appeal—and judging from its appearance, a considerably longer storage life could be expected.

These advantages were obtained by the addition of 20 pounds of Celite 545 to each 900-lb. batch of grapes pressed.

Filter Trouble Corrected with Hyflo*

(reported by J-M Engineer R. J. Amberg)

DETROIT DISTRICT: A wine company reported trouble with a new filter which they had installed recently and I was called in to assist.

The problem was to handle the settlings from several thousand gallons of wine without increasing the amount of filter aid which they had been using. The wine is pumped from the main cask to a 260-gallon mixing tank and from there to the filter. There are no facilities for pre-coating with anything but unfiltered wine. We put ten pounds of Hyflo in 200 gallons of wine in the mixing tank and circulated this until clarity was obtained. This was a matter of only a few minutes. The clear filtrate was then turned to a receiving tank. The flow rate was estimated at 6 gallons per square foot of filter area per hour after filtering about 200 gallons.

*T. M. Reg. U. S. Pat. Off.

Engineering Help Solves Filtration Problem

(reported by J-M Engineer G. F. Huber)

BOSTON DISTRICT: One of my customers was having difficulty due to the filter powder coming through the ceramic filter medium. I checked the operation with their technical director and found that incomplete venting of the air from the filter body during precoating permitted air to remain trapped in the upper part of the filter. This prevented the precoat suspension from filling the filter and depositing an even coat upon the stone. As the filtration was continued, the liquid level in the filter rose and gradually displaced the air but meanwhile, of course, some filter aid passed through the stone.

I suggested complete air venting at the start of the precoating and installing a valve on the outlet side. This change in operation resulted in a decided improvement and, needless to say, the customer was greatly pleased.

Your New Problem may be an old one to the CELITE Engineer

These case histories show not only what Celite Filter Aids can do but also how Johns-Manville Filtration Engineers can help you. Small, simple changes in equipment or technique often lead to big results because J-M Engineers combine scientific knowledge with wide practical experience on many filtration problems. In addition, they have access to the resources of the J-M Research Laboratory where modern filtering techniques and filter aids were developed.

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and preferably without stacking, in order to permit free circulation of the cool night air. In other cases, where precooling rooms are available in connection with the grading room, the containers should be stacked only three or four high to provide ample air circulation.

References

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Conditions of storage, including temperature, humidity, air circulation, method of stacking, and housekeeping, will be covered in the concluding Part III of this article to be published in a subsequent issue of FOOD INDUSTRIES.

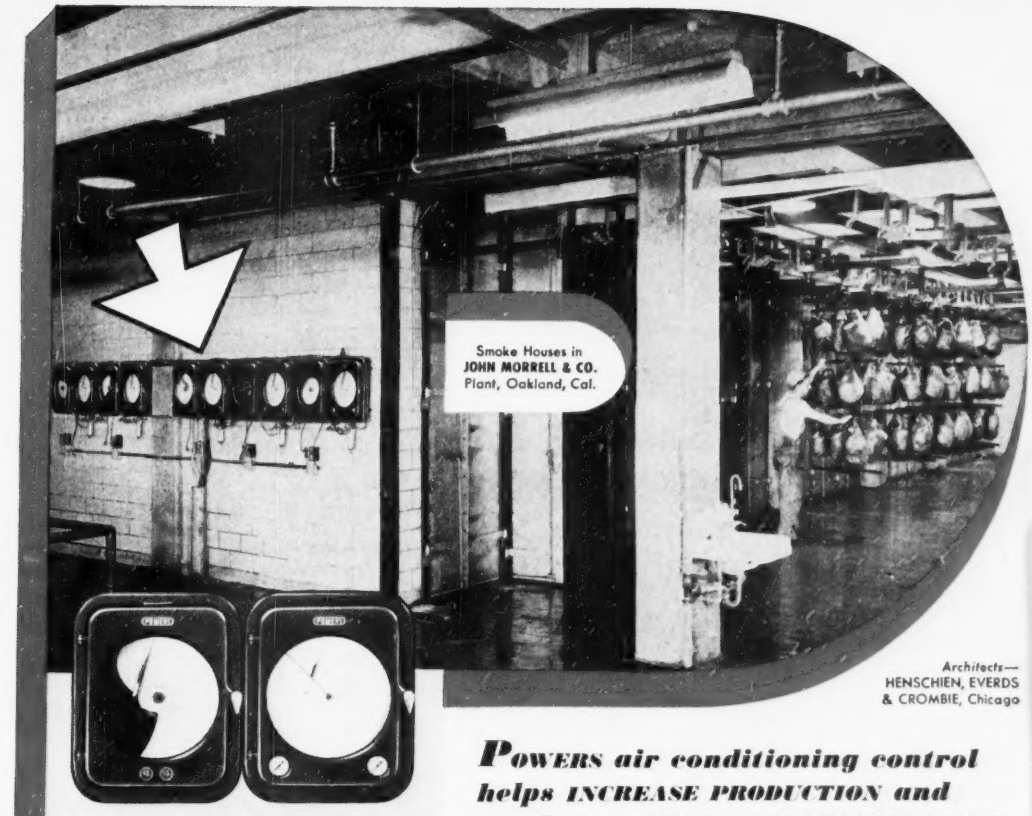
—End—

Welcome New Ideas

—Continued from page 79

However, one ham in each batch is pressed into a special mold—one with a hole drilled through one end to take the thermocouple. All hams are then loaded into the boiling vat, with the test ham somewhere in the center of the batch.

At the start of the process, the temperature of the water is close to boiling. But considerable time must elapse before the heat penetrates into the center of the hams. When, however, the cooking approximates a thorough heating, the operator, merely consults the precision temperature indicator, located in a central spot in the ham-boiling department. By manipulating the multiple selector switch, which connects the instrument to any one of the thermocouples in the 12 vats, he can read the temperature of each control ham on the instrument. Thus, a number of needless steps are eliminated and the operator is able to work more efficiently. When the internal temperature of the ham reaches 152 deg. F., it is held at this point of 3 hours.



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Proper internal temperature is not the only factor, according to Esskay. It also holds that careful control of the temperature of the cooking water likewise improves the taste and tenderness of boiled hams. Hence, a system has been set up whereby temperature of the cooking water is gradually reduced in a series of steps until the hams are finally removed from the vats.

This accurate control is insured by a recording controller working through a thermal bulb located in each vat. By air-pressure diaphragms, steam and cold water valves are regulated, thus precisely adjusting the temperature of the cooking water, as pre-set on the instrument.

The fine control is obtained by factors of the two valves—a normally-opened cold water valve that closes when the air pressure exceeds 6 lb. and a normally-closed steam valve that opens when the air pressure exceeds 9 lb.

Use of this control permits the operator to step up or step down the temperature of the cooking water, and to hold any desired temperature to obtain the proper cook.

Granted, putting new ideas to work costs money. But this investment results in a saving—and a profit—because labor is cut and output is raised by adopting new methods of boning and cooking hams.

—End—

Novel Air Sweeper

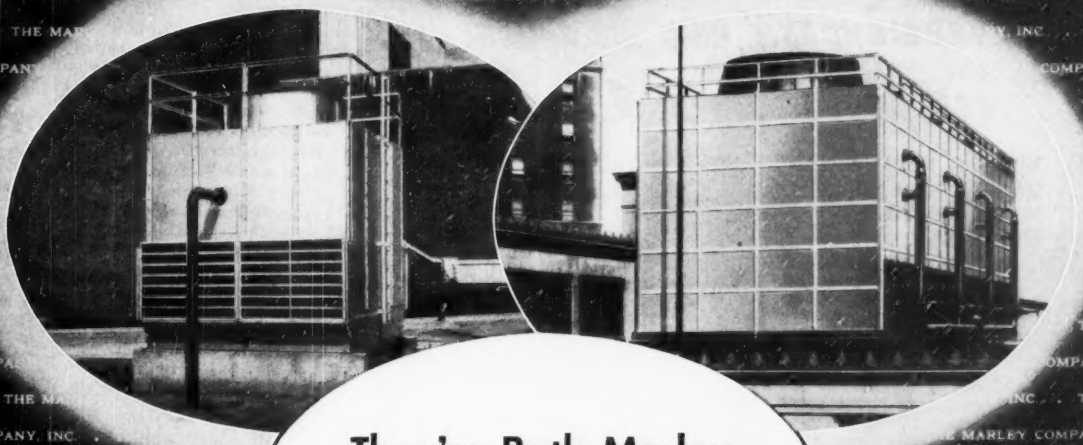
—Continued from page 84

capacity reduction due to the Broom was never very apparent. But experience on a limited number of products appears to indicate that an increase of 5 deg. F. in dryer inlet temperature will more than compensate for capacity reduction due to a Broom, and even in seasons of high humidity.

Speeds that ran in range of ½ to 3 rpm. were employed, with the optimum found to be about 1 rpm. Higher speeds caused excessive vibration of the Broom, whereas speeds below 1 rpm. did not allow for a thorough cleaning job.

Design factors—as to the quantities, temperature, humidity, and pressures of the air, and the mechanical features of the broom—will vary with different dryers and products dried. However, the experimental unit here described was built into a tall, cone-bottomed cylindrical tower 18 ft. in dia. Some 16 linear feet of cone surface, plus 40 ft. of side wall, are cleaned by the device.

Experimental evidence promises effectiveness of such a unit in similar towers of relatively greater diameter,



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The **VAIRFLO** (left) a medium capacity cooling tower with extra quality features at no extra cost. Vairflo extras include a balanced spray system with patented Marley low pressure nozzles . . . totally enclosed motor . . . grease packed ball bearings in enclosed bearing housing . . . lifetime nail-less filling . . . filling that is easily removed and installed . . . complete basin fixtures . . . Marley-designed cooling tower fan . . . multiple cells if desired . . . extra heavy framing and casing to give unusually long service. The Vairflo sets a new standard for air conditioning and refrigeration service. Available in wood or steel. Bulletin V-50.

The **CONVENTIONAL** (right) with a model to meet all heavy duty water cooling requirements. Only Marley Conventional towers offer all these features . . . rigid fan cylinders . . . cast aluminum or stainless steel fans . . . motors propery located outside the fan cylinder . . . positive drive action . . . drift eliminators independent of the distribution system . . . spray nozzle distribution . . . nail-less filling . . . independent louver posts . . . exclusive Marley mechanical equipment. Available in wood or steel. Asbestos board casing if desired. Bulletin C-50.

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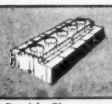
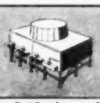

Double-Flow

Vairflo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Natural Draft

Counter-Flow

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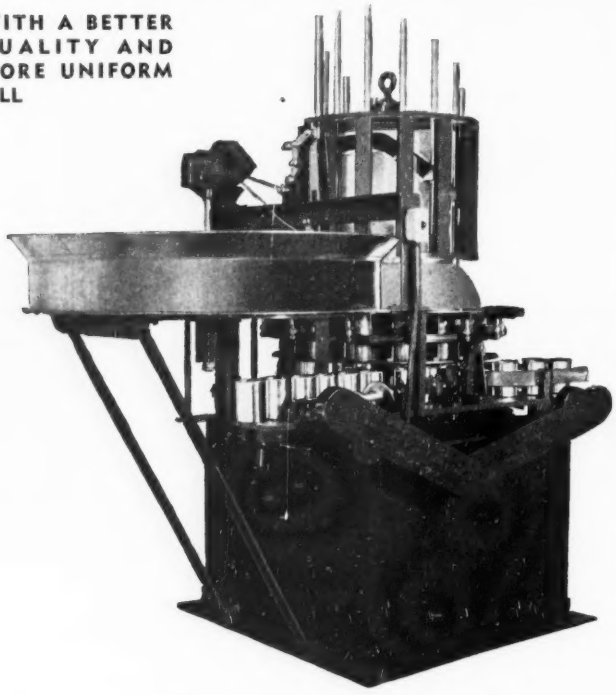

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Write for complete specifications and prices for this outstanding Filler that will handle from 60 to 150 cans a minute, depending on the product.

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when products difficult to dry are involved.

Although the experimental Air Broom was developed from entirely independent research by Central Laboratories of General Foods Corp., it has certain operating functions similar to the Bowen Air Sweeper (Patent No. 1,946,566), although it is actually very different mechanically from the latter unit.

The typical Bowen unit does not incorporate an external blower, but rather is driven by air reaction. And, so far as is known to the writer, the Bowen unit has never been commercially adapted to cleaning the side walls of a dryer to the degree provided by the Air Broom.

—End—

Germicidal Detergents

—Continued from page 71

small operations, unit tank pasteurizers are used. The fact that hundreds of thousands of cases of packaged fresh cucumber pickles have been packed successfully each year by following, essentially, this general procedure adds commercial evidence to the data obtained by the experimental tests covered in this presentation.

In reporting the results of the studies made at Michigan Agricultural Experiment Station on the washing of fresh cucumbers, there is no attempt to minimize the importance of using germicides and detergents in food-processing plants.

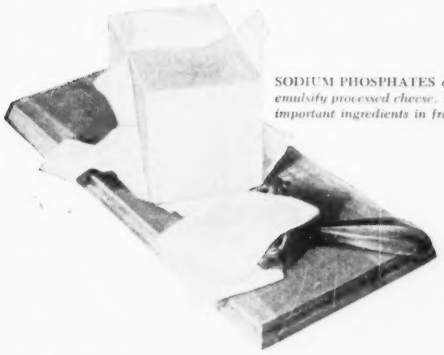
Germicides and detergents are important adjuncts to food processing and to food-plant sanitation, and they have a definite place in the industry. Their greatest use is in cleaning and sanitizing machinery, utensils, walls and floors. Equipment and utensils are thoroughly rinsed with either cold or hot water, or both, before using, to rid them of all traces of these chemicals.

But it is an entirely different matter when these chemicals are used to clean or sanitize the food itself. Such a practice may occasionally be justified if it can be shown that none of the chemicals remain in, or on, the food and that reduction of the microbial population to obtain preservation is impossible by accepted physical methods, such as heating, freezing or dehydration, or by chemical methods such as salting or pickling.

However, few, if any, such justified cases actually exist in the food industry, because when a food is so grossly contaminated with microorganisms that it is necessary to employ chemicals to prepare it for processing, the

NIFOS*-T *is one of many Monsanto chemicals used to control insect pests that attack growing vegetables, fruits.*

SODIUM BENZOATE *preserves foods;* PHOSPHATES *(mineral supplements) add desirable enrichment to bread.*



SODIUM PHOSPHATES *add nutrients, help emulsify processed cheese.* PLASTICIZERS *are important ingredients in free-film wrappers.*

ETHAVAN,* *properly formulated, adds vanilla-like flavor to extracts, ice cream, confections, candies.* PHOSPHATES *in prepared mixes make better cakes, biscuits, doughnuts.*

SANTOCEL,* *with higher insulating value, permits thinner freezer walls; adds to inside storage space; doesn't increase outside case dimensions.*

Let's eat

The food industry has made "let's eat" two of the most popular words in the English language.

Monsanto, too, helps by supplying chemicals used throughout this important industry – from the growing of food to its final packaging and sale.

Many fruits and vegetables, for instance, thrive when protected against insects by formulations of Monsanto agricultural chemicals.

Processed cheese is made with Monsanto sodium phosphates which act as emulsifiers; make cheese smooth. Free-film wrappers, containing Monsanto plasticizers, protect many foods against contamination.

Jellies and jams are preserved with Monsanto sodium benzoate. Bread is enriched with Monsanto mineral supplements.

Cake à la mode tastes better because of Monsanto products. Monsanto phosphates help make cake light, fluffy – ice cream gets its delicious vanilla-like flavor from Monsanto Ethavan.

Frozen food cases, with wall insulation of Monsanto Santocel, provide more storage space, keep frozen foods fresh.

To the Food Industry . . . These are only a few of the many instances where "let's eat" involves Monsanto Chemicals. If you are interested in any phase of the food industry – growing, cleaning, processing, formulating, packaging or sales – write Monsanto Chemical Company, 1737-A South Second Street, St. Louis 4, Missouri, or return the coupon. In either case, please outline your interests as specifically as possible.

Reg. U. S. Pat. Off.

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CHEMICALS — PLASTICS

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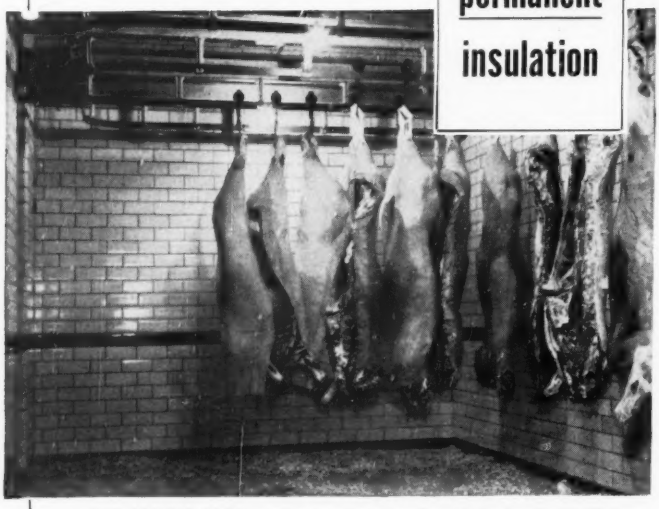
Keep refrigeration costs LOW . . .

. . . with permanent insulation



THIS COOLING ROOM, used to store meat products, is insulated with PC Foamglas. This cellular glass material meets all refrigerating and sanitary requirements.

● First cost is last cost when you install PC Foamglas Insulation. For it is true glass, therefore impervious to many elements that cause other insulation to deteriorate.

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You need have no fear of costly repairs or replacements when Foamglas is installed according to our recommendations and specifications, for it retains its original insulating effectiveness *permanently*.

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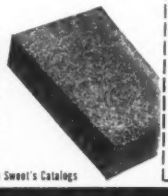
The entire strong, rigid block is composed of millions of sealed glass bubbles. They form a continuous structure, so no air, moisture, vapor or fumes can get into or through the Foamglas block. In those closed glass cells, which contain still air, lies the secret of the material's permanent insulating efficiency.



For additional information see our inserts in Sweet's Catalogs

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Please send me without obligation, a sample of Foamglas and your FREE folder on the use of PC Foamglas Insulation for refrigerated space.

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quality of the food has already been impaired to such an extent that it no longer is fit to be preserved or processed.

Furthermore, it is an accepted practice with federal agencies, such as the Food & Drug Administration and state inspection agencies, to condemn as illegal the use of chemicals for such purposes, especially when it can be shown that their use is not necessary.

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The above article is based on a paper presented by the junior author to the faculty of Michigan State College in partial fulfillment of his M. S. degree, and it was read before the 1949 Technical School for Pickle & Kraut Packers, East Lansing, Mich. (Journal Article No. 1051).

—End—

Dexterity Tests

—Continued from page 45

"snappy" were chosen. Now weight and physical appearance vary as much as age.

The object of the tests, of course, was to increase the production rate on the hand-packing lines. The greater the proportion of the total asparagus pack produced as whole spears, the better the market picture, viewed from both demand and price. But there is another angle. Even though the incentive is in direct proportion to the increase above a norm, the greater the production per hand-packer man hour, the lower the final cost per case. A considerable portion of the cost per case is the fixed labor overhead of

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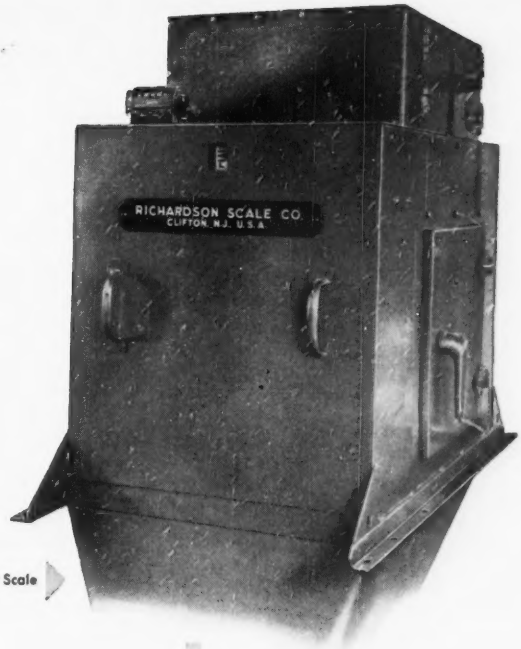
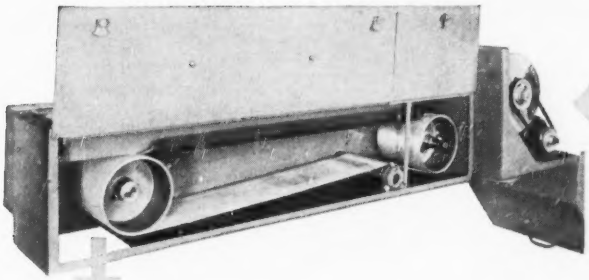


Richardson E-50 Automatic Bulk Hopper Scale



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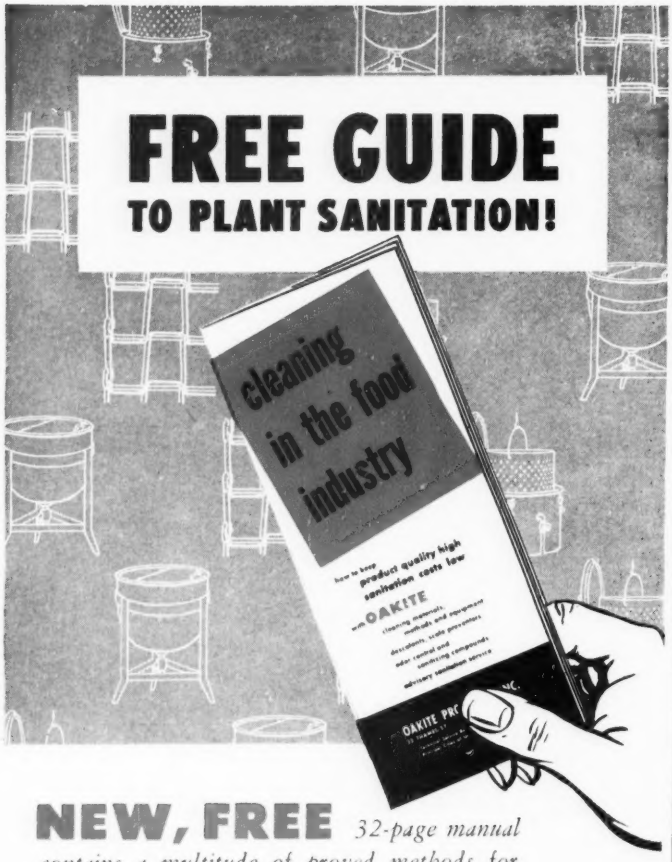
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those whose work and pay is independent of the production volume. Among these are employees who operate closing machines and stack cases on pallets.

Production Almost Doubled

As the result of assigning dexterity-selected employees to the hand-packing lines, the average number of cases of spears per packer hour increased 33.95 percent in 1949. Average output per man hour of all employees on the production line has practically doubled (Fig. 2).

Dexterity tests also revealed employee abilities and characteristics needed for important production operations other than hand packing. One woman who had been hired at the age of 74, and who is now 81, was tried out on work which the test indicated she could perform. The results were surprisingly satisfactory.

Test Has Broad Significance

Obviously, both the Ritter company and its employees have profited from dexterity testing. But more important is the significance of this experiment to all industry. There has been a trend toward younger employees. Admittedly, youth has its advantages. However, the allocation of production-line responsibility according to dexterity tests indicates that maturity and old age have their assets too.

Youth is credited with superior manual strength and endurance. The trend in industry, however, is to eliminate heavy manual tasks and to replace men with machines. Manual strength and endurance are of declining importance.

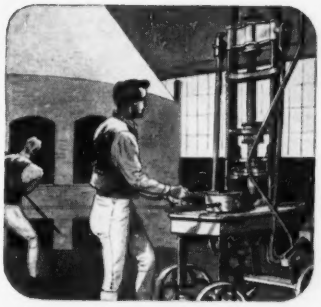
Youth has better general health. But safeguards by industry and a higher standard of living have improved the health of employees throughout their working years. Health of women employees often improves with age.

Youth is more ambitious. Yet workers who have matured enough to know their abilities and limitations are steady, reliable workers. Furthermore, older employees are less susceptible to rabble-rousing influences. A scattering of them among young workers has a stabilizing effect.

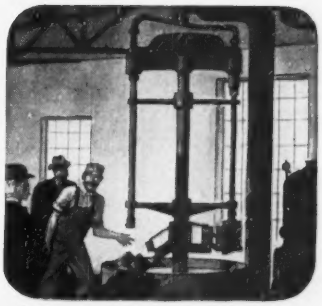
Youth has greater aptitude for learning skills. However, there is no guarantee that these acquired skills will not be transferred to another company.

The downward trend in employable age is paralleled by another development in labor relations. We refer to the provision of security in old age. The cost will be paid, largely by industry, through taxes and pensions. It may be more to the benefit of both industry and workers to extend the profitable productive life of aging employees. Dexterity tests will help to do this. —*End*

1 1621—Glass was money! America's first glass factory was actually a mint—not for the manufacture of coins but to make glass beads for *use* as money when buying land, food and furs from the Indians.



2 1827—Blown glass was the rule until Enoch Robinson, a carpenter, figured glass could be *pressed* into shape . . . the glass pressing machine was born. Electricity to power new machines was still to come.



3 1899—Owens invented a machine to make bottles as the machine age arrived in glass. By 1915, Howell "Red Band" Motors were making important contributions to this and other industries.

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GLASS...from artisans to automatic machines

4 Today—Modern, electrically driven machines have improved quality, cut costs and increased output in the glass making industry. For example, this unique glass beveling machine, equipped with 7 dynamically balanced Howell Motors, *automatically* bevels glass at the rate of 2,000 inches per hour!

You'll also find precision-built Howell Industrial Type Motors powering bottle and bulb machines, conveyors, grinders, polishers, plate and window machines in the glass industry.

Elsewhere, Howell's wide range of standard NEMA motors, and special motors designed to customer requirements, serve dependably and efficiently under the toughest conditions.

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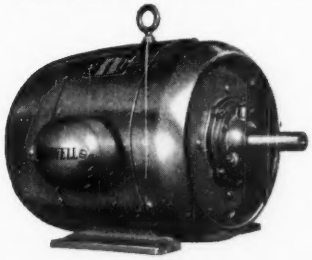
Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

Howell totally enclosed, fan-cooled motor—windings completely sealed against dirt and weather.



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Index and Outlook

—*Continued from page 4*

Meatpacking and *confectionery* also remain at the old level. And these series, too, show more moderate month-to-month swings because of improvements in the seasonal adjustments.

Baking is now estimated at a somewhat lower level. This is the result of more accurately classifying the various establishments connected with the baking business. In the new breakdown made by the Bureau of Labor Statistics, and used by FOOD INDUSTRIES, baking done in retail bakeshops is excluded from the production series. Only the output of commercial bakeries is included.

Canning is estimated at a higher level. BLS has found output per man-hour in the canneries to be greater than was formerly thought. So FI is raising the level of its canning index, which continues to be based on man-hours worked. There is also a revision of the indicated trend of canning in September and October, for the same reasons that affected the overall index in those months.

Sugar is now a single series, combining production of beet and cane sugar. For the Bureau of Labor Statistics is now reporting employment in both branches of the sugar industry as one total.

Evaporated milk is now a physical-output series replacing the former chart which was entitled condensed milk but which represented chiefly evaporated milk production. For recent years, the new chart shows a much lower level of production. This may be due to the fact that employment data formerly reported by BLS included plants many of whose employees were engaged in the manufacture of other products, even though milk was the principal product. It is also possible that the physical-output figures reported by the Department of Agriculture will be revised upward.

Flour production also appears lower when estimated on the basis of physical output, and for the same reasons: Some milling companies have large byproduct divisions, which makes it difficult to estimate production on the man-hour basis. But the physical output series is also subject to statistical difficulties and to revision.

Ice cream is another case where physical-output figures compiled by the Department of Agriculture have been substituted for man-hour data. In this case, the new level is higher. However, Agriculture's figures have recently been revised downward, and further revisions may bring the pro-

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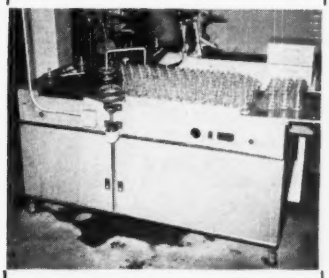

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duction level nearer to that shown in our original chart.

Malt liquors. Here, the level is not much different. But the month-to-month swings are much wider. This is because the new physical-output series measures only the number of barrels produced. It does not include warehousing and bottling activities, as in the old man-hour series.

Butter and margarine are practically unchanged. Slight modifications have been made in the adjustments for seasonal variation.

Beverages and *cereals*, as stated, have been dropped from the FI index—for lack of data. Employment figures for these groups are no longer being collected, and there is no adequate substitute series.

Cheese has been added as a new component. The FI index of cheese production is based on physical output as reported by the Department of Agriculture. It includes American and other types of cheese.

Interpreting New Charts

Where the chart for a particular product has been changed from a man-hour basis to a physical-output basis, readers will want to keep in mind certain rules for interpreting the new figures. Here are some of the things to remember when looking at an index of physical output:

Output figures, like those published by the Department of Agriculture, are estimated from sample data collected from a number of producers. Consequently, the new charts measure production in about the same manner as did the old charts based on man-hours worked at a sample number of plants. They are as accurate as the sample taken by the government agency. And the government figures are revised whenever the sample can be improved. Whenever such revisions are made they will be applied to the FI indexes.

The charts based on physical output measure production at the last stage. That is, they reflect the output of finished products. The old charts based on man-hours measured the work being done at all stages of production. The man-hour indexes were highly sensitive to changes in the rate of output because any decline (or rise) was reflected in less hours worked, even in the first stage of the productive process. The new indexes on the other hand reflect only the amount of food products being finished.

If the factors named are kept in mind, the new charts will "do the work" just as did the old ones. For the actual trend of production—which is the vital fact for management—will be shown just as clearly (although sometimes a little more slowly) in the charts based on physical output.

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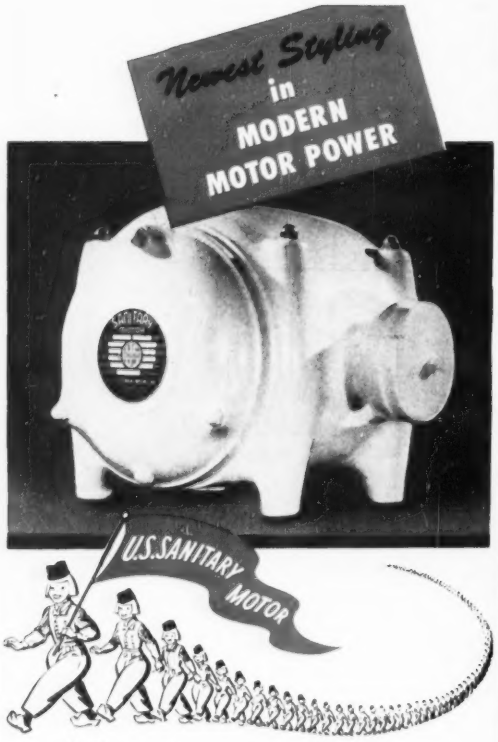

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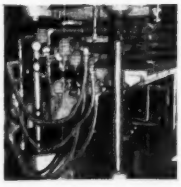

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We all know unreasonable generalizations can be dangerously false. Common sense and on-the-job experience show us the value of dealing specifically with ideas, problems—and *people*.

Let's not make the big—and costly—mistake, then, of generalizing on religious or racial groups. Adopt and *carry out* these common sense principles:

1. Accept—or reject—people on *their individual worth.*
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3. Speak up, wherever we are, *against* prejudice. Work for understanding.

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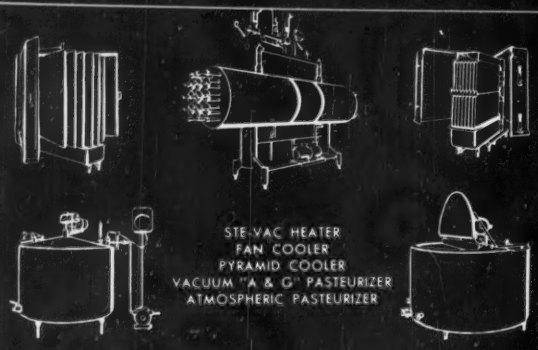

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ATMOSPHERIC PASTEURIZER

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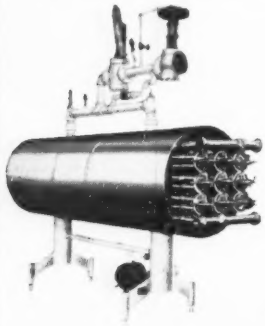

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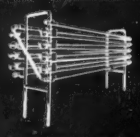

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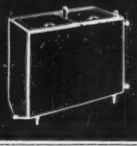

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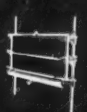
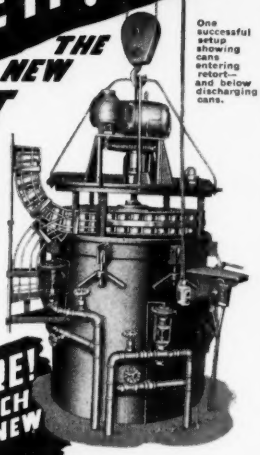


DEALER COOLERS

SUPER DEODORIZER

DID YOU SEE IT! THE NEW BOTT RETORT LOADER UNLOADER

One successful setup showing cans entering retort—and below discharging cans.



Were you among the hundreds who saw this 1950 machine in operation at Atlantic City? Then you know what we mean by "the first real answer to a mechanized cookroom." If you were not there, let us send you descriptive details — the next best thing to a demonstration.

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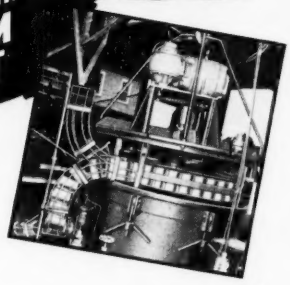

No more of 1890 methods . . .

manual handling of cans from the closing machine to warehouse went out of date with introduction of the Bott Retort Loader-Unloader . . . now the unanimous opinion of hundreds of canners. You'll agree too once you see it in operation.

SAVE . . .

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- ★ COOKING TIME
- ★ COOLING TIME
- ★ CAN DAMAGE
- ★ CONTAMINATION
- ★ CAN STORAGE SPACE
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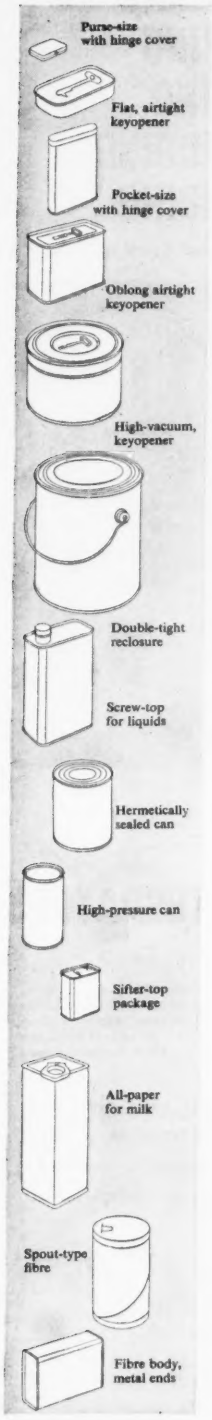

"OB-ROUND" shape means more cans pack in shipping container; more squirt per squeeze—from bellows-action sides that won't stick. Three heights (same size base): 1 oz; 3 oz; 4 oz. Full space for litho-label in many colors. Two types of closing machines available—for high-speed and for semi-automatic, limited production.

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In addition to lighter fluid

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It's a thought to consider, and perhaps your package-development people and ourselves should talk things over.

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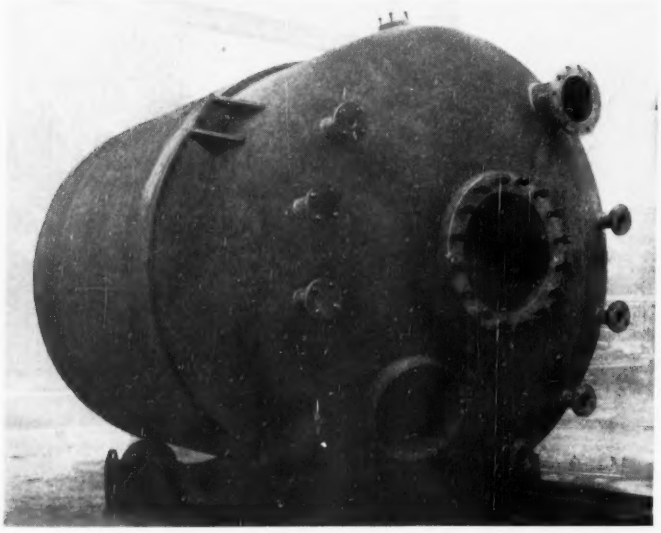

The above photo is of a dissolving tank 8'6" O.D. x 11'0" long, of straight, 20% Nickel Clad, and testing at 75#.

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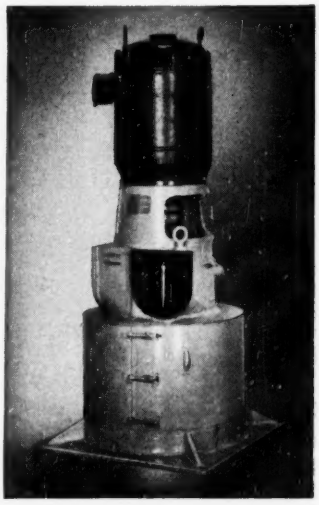

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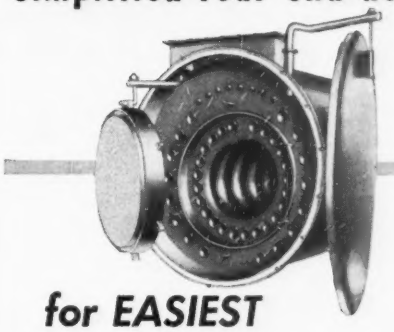

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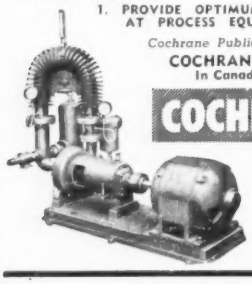

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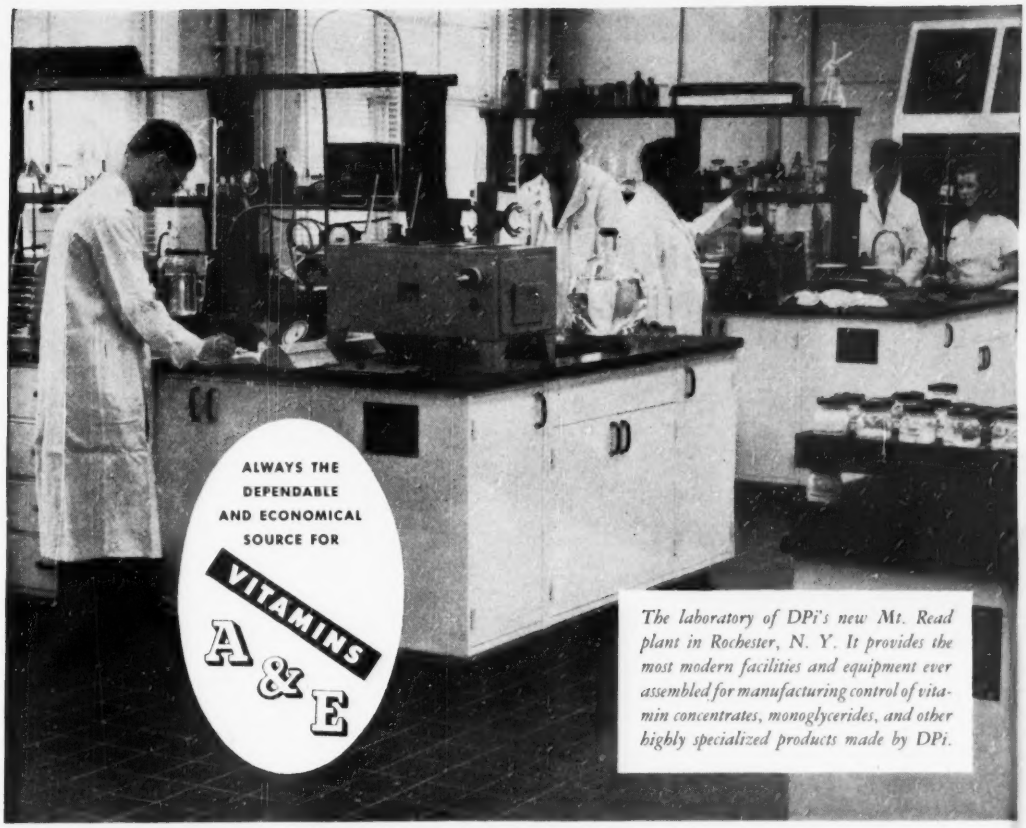

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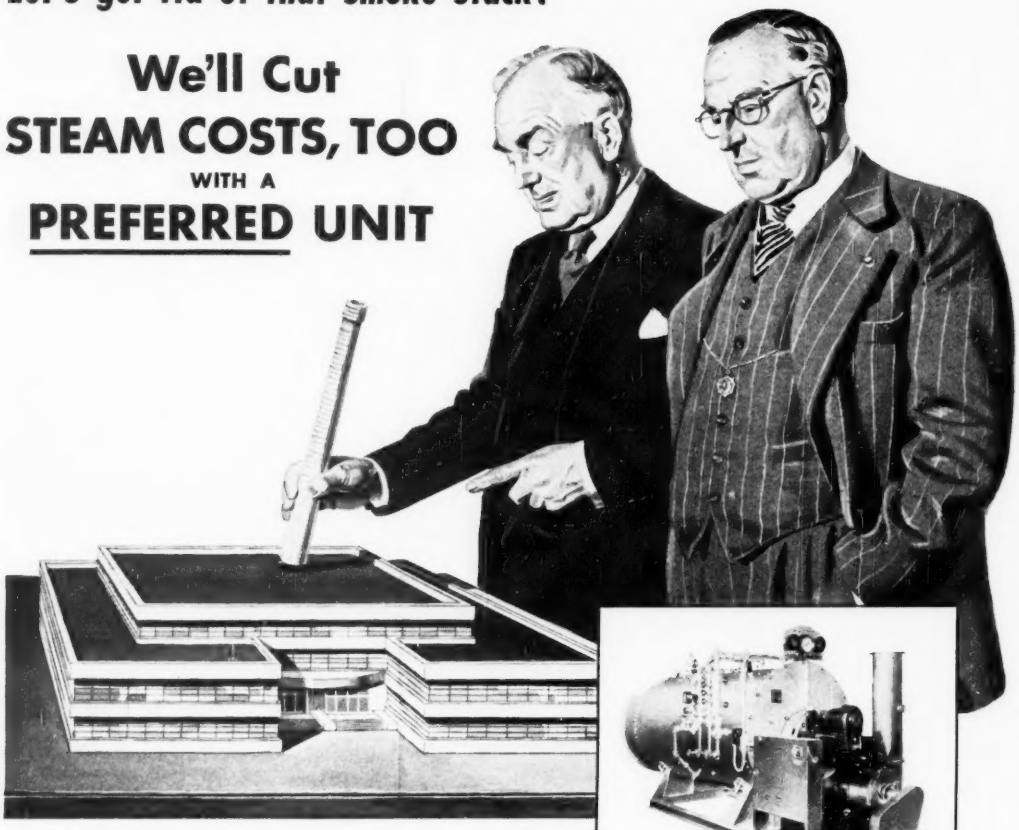

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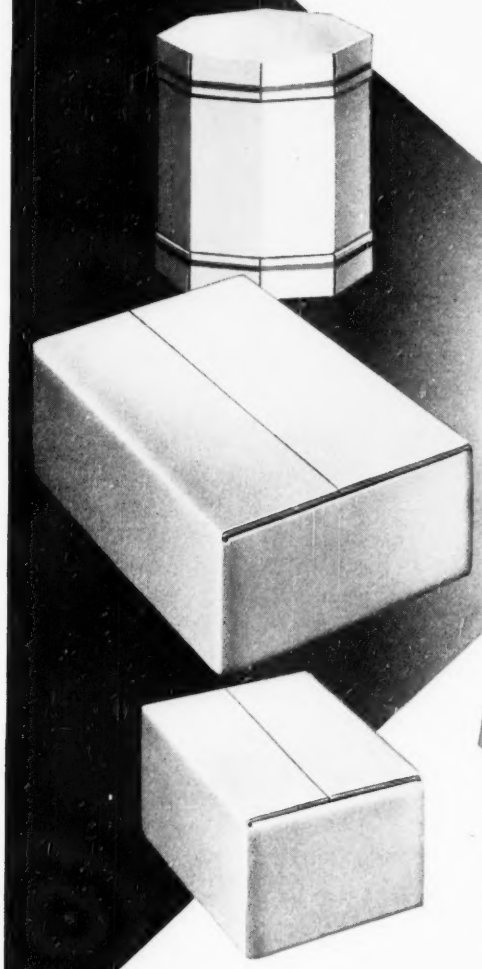

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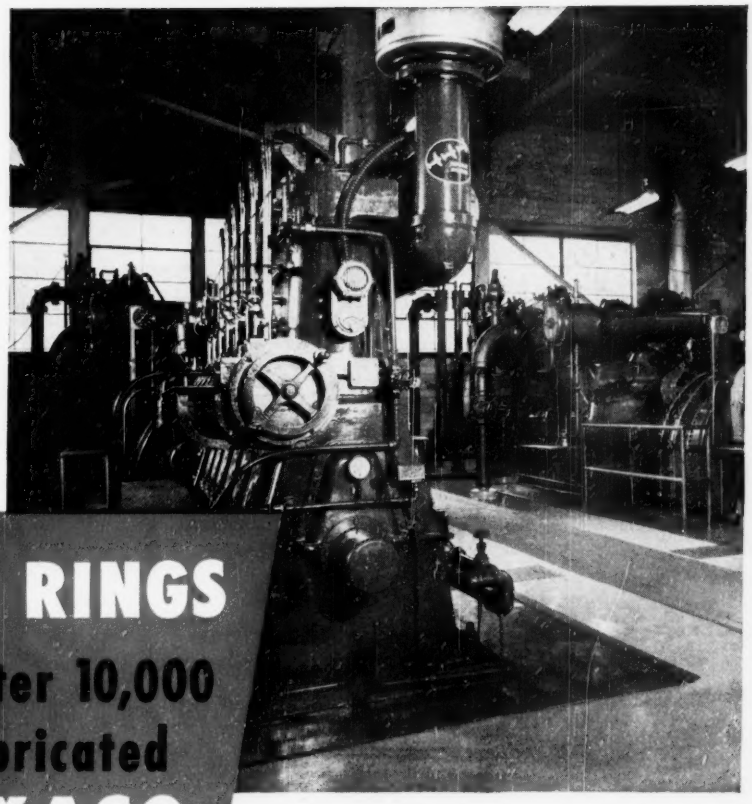

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